Cisco SCE8000 Installation and Configuration Guide

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Cisco SCE8000 Installation and Configuration Guide

CONTENTS

About this Guide

This preface describes who should read the *Cisco SCE8000 Installation and Configuration Guide*, how it is organized, and its document conventions.

This guide is for the networking or computer technician responsible for installing and configuring the SCE8000 platform on-site. To use this publication, you should be familiar with telecommunications equipment and installation procedures, as well as electronic circuitry and wiring practices. You should also have experience as an electronic or electromechanical technician.

This installation guide explains the initial hardware installation and basic configuration procedures for the SCE8000. It contains procedures for unpacking and installing the device and performing basic configuration via the setup wizard. After completing the installation and basic configuration procedures covered in this guide, you will then use the appropriate companion publications to more completely configure your system.

This guide contains instructions on how to install and run the SCE8000 platform. This guide assumes a basic familiarity with telecommunications equipment and installation procedures.

Document Revision History

Revision	Cisco Service Control Release and Date	Change Summary
OL-16478-02	3.1.7 December, 2008	Added explanation of casacade topology and cabling.
OL-16478-01	3.1.6S June, 2008	First version. New document for new product.

Organization

The major sections of this guide are as follows:

Chapter	Title	Description
1	Cisco Service Control Overview, page 1-1	This chapter provides a brief introduction to Cisco Service Control.
2	Introduction to the Cisco SCE8000 Platform, page 2-1	This chapter provides a hardware overview of the SCE8000 platform.
3	Cisco SCE8000 Topology and Topology-Related Parameters, page 3-1	This chapter describes the possible deployment topologies of the SCE8000 and explains how various aspects of the topology determine the configuration of the system.
4	Installing the Cisco SCE8000 Chassis, page 4-1	This chapter explains how to install a SCE8000 platform in the rack and properly ground it.
5	Connecting the Management Interfaces, page 5-1	This chapter explains how to connect the SCE8000 platform to a local console and perform the initial system configuration via the setup wizard that runs automatically.
6	Cabling the Line Ports and Completing the Installation, page 6-1	This chapter provides instructions for cabling the Gigabit Ethernet ports for both one and two SCE8000 topologies, and for configuring Gigabit Ethernet (GBE) interface parameters. In a topology utilizing two SCE8000s (cascade), this includes the cascade ports as well as the line ports.
7	Basic Cisco SCE8000 Platform Operations, page 7-1	This chapter describes how to start up the SCE8000 platform, reboot, and shutdown. It also describes how to manage configurations.
8	Troubleshooting, page 8-1	This chapter provides basic system startup troubleshooting information.
9	Removal and Replacement Procedures, page 9-1	This chapter explains the procedures for removing and replacing the power supplies, fan trays, and other modules.
A	Using Optical Splitters with 10GBE Links, page A-1	This appendix supplies important information regarding supported and not supported optical splitter configurations in the 10GBE environment.

Related Publications

Your SCE8000 platform and the software running on it contain extensive features and functionality, which are documented in the following resources:

- Cisco CLI software:
  - *Cisco SCE8000 Software Configuration Guide*
  - *Cisco SCE8000 CLI Command Reference*
- For initial installation and startup information, refer to the *Cisco SCE8000 Quick Start Guide*.
- For international agency compliance, safety, and statutory information for wide-area network (WAN) interfaces for the SCE8000 platform, refer to the *Regulatory Compliance and Safety Information for Cisco SCE8000*.
- For installation and configuration of the other components of the Service Control Management Suite refer to:
  - *Cisco SCMS Subscriber Management User Guide*
  - *Cisco SCMS Collection Manager User Guide*
  - *Cisco Service Control Application for Broadband User Guide*
  - *Cisco Service Control Application Reporter User Guide*
- To view Cisco documentation or obtain general information about the documentation, refer to the Cisco Information Packet that shipped with your SCE8000 platform.

Conventions

This document uses the following conventions:

Convention	Indication
bold font	Commands and keywords and user-entered text appear in **bold** font.
italic font	Document titles, new or emphasized terms, and arguments for which you supply values are in *italic* font.
[ ]	Elements in square brackets are optional.
{x | y | z }	Required alternative keywords are grouped in braces and separated by vertical bars.
[x | y | z]	Optional alternative keywords are grouped in brackets and separated by vertical bars.
string	A nonquoted set of characters. Do not use quotation marks around the string or the string will include the quotation marks.
`courier` font	Terminal sessions and information the system displays appear in `courier` font.
< >	Nonprinting characters such as passwords are in angle brackets.
[ ]	Default responses to system prompts are in square brackets.
!, #	An exclamation point (!) or a pound sign (#) at the beginning of a line of code indicates a comment line.

Note Means *reader take note*.

Tip Means *the following information will help you solve a problem*.

Caution Means *reader be careful*. In this situation, you might perform an action that could result in equipment damage or loss of data.

Timesaver Means *the described action saves time*. You can save time by performing the action described in the paragraph.

Warning **Means *reader be warned*. In this situation, you might perform an action that could result in bodily injury.**

Obtaining Documentation and Submitting a Service Request

For information on obtaining documentation, submitting a service request, and gathering additional information, see the monthly *What's New in Cisco Product Documentation*, which also lists all new and revised Cisco technical documentation, at:

http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

Subscribe to the *What's New in Cisco Product Documentation* as a Really Simple Syndication (RSS) feed and set content to be delivered directly to your desktop using a reader application. The RSS feeds are a free service and Cisco currently supports RSS version 2.0.

CHAPTER 1

Cisco Service Control Overview

This chapter provides a general overview of the Cisco Service Control solution. It introduces the Cisco service control concept and capabilities.

It also briefly describes the hardware capabilities of the service control engine (SCE) platform and the Cisco specific applications that together compose the complete Cisco service control solution.

Cisco Service Control Solution

The Cisco service control solution is delivered through a combination of hardware and specific software solutions that address various operational and business-related challenges. Service providers can use the SCE platform to support classification, analysis, and control of Internet and IP traffic.

Service control enables service providers to:

- Capitalize on existing infrastructure.
- Analyze, charge for, and control IP network traffic at multigigabit wire line speeds.
- Identify and target high-margin content-based services and enable their delivery.

As access and bandwidth have become commodities where prices continually fall and profits disappear, service providers have realized that they must offer value-added services to derive more revenue from the traffic and services running on their networks.

Cisco service control solutions allow the service provider to capture profits from IP services through detailed monitoring, precise, real-time control, and awareness of applications as they are delivered.

Service Control for Broadband Service Providers

Service providers of any access technology (DSL, cable, mobile, and so on) targeting residential and business consumers must find new ways to get maximum leverage from their existing infrastructure, while differentiating their offerings with enhanced IP services.

The Cisco service control application for broadband adds a layer of service intelligence and control to existing networks that can:

- Report and analyze network traffic at subscriber and aggregate level for capacity planning
- Provide customer-intuitive tiered application services and guarantee application service level agreements (SLAs)
- Implement different service levels for different types of customers, content, or applications
- Identify network abusers who are violating the acceptable use policy (AUP)
- Identify and manage peer-to-peer traffic, NNTP (news) traffic, and spam abusers
- Enforce the AUP
- Integrate Service Control solutions easily with existing network elements and business support systems (BSS) and operational support systems (OSS)

Cisco Service Control Capabilities

The core of the Cisco service control solution is the network hardware device: the Service control engine (SCE). The core capabilities of the SCE platform, which support a wide range of applications for delivering service control solutions, include:

- Subscriber and application awareness—Application-level drilling into IP traffic for real-time understanding and controlling of usage and content at the granularity of a specific subscriber.
  - Subscriber awareness—The ability to map between IP flows and a specific subscriber to maintain the state of each subscriber transmitting traffic through the SCE platform and to enforce the appropriate policy on this subscriber's traffic.

    Subscriber awareness is achieved either through dedicated integrations with subscriber management repositories, such as a DHCP or a RADIUS server, or through sniffing of RADIUS or DHCP traffic.
  - Application awareness—The ability to understand and analyze traffic up to the application protocol layer (Layer 7).

    For application protocols implemented using bundled flows (such as FTP, which is implemented using Control and Data flows), the SCE platform understands the bundling connection between the flows and treats them accordingly.
- Application-layer, stateful, real-time traffic control—The ability to perform advanced control functions, including granular bandwidth (BW) metering and shaping, quota management, and redirection, using application-layer, stateful, real-time traffic transaction processing. This requires highly adaptive protocol and application-level intelligence.
- Programmability—The ability to quickly add new protocols and adapt to new services and applications in the service provider environment. Programmability is achieved using the Cisco Service Modeling Language (SML).

  Programmability allows new services to be deployed quickly and provides an easy upgrade path for network, application, or service growth.
- Robust and flexible back-office integration—The ability to integrate with existing third-party systems at the service provider, including provisioning systems, subscriber repositories, billing systems, and OSS systems. The SCE provides a set of open and well-documented APIs that allows a quick integration process.
- Scalable high-performance service engines—The ability to perform all of these operations at wire speed.

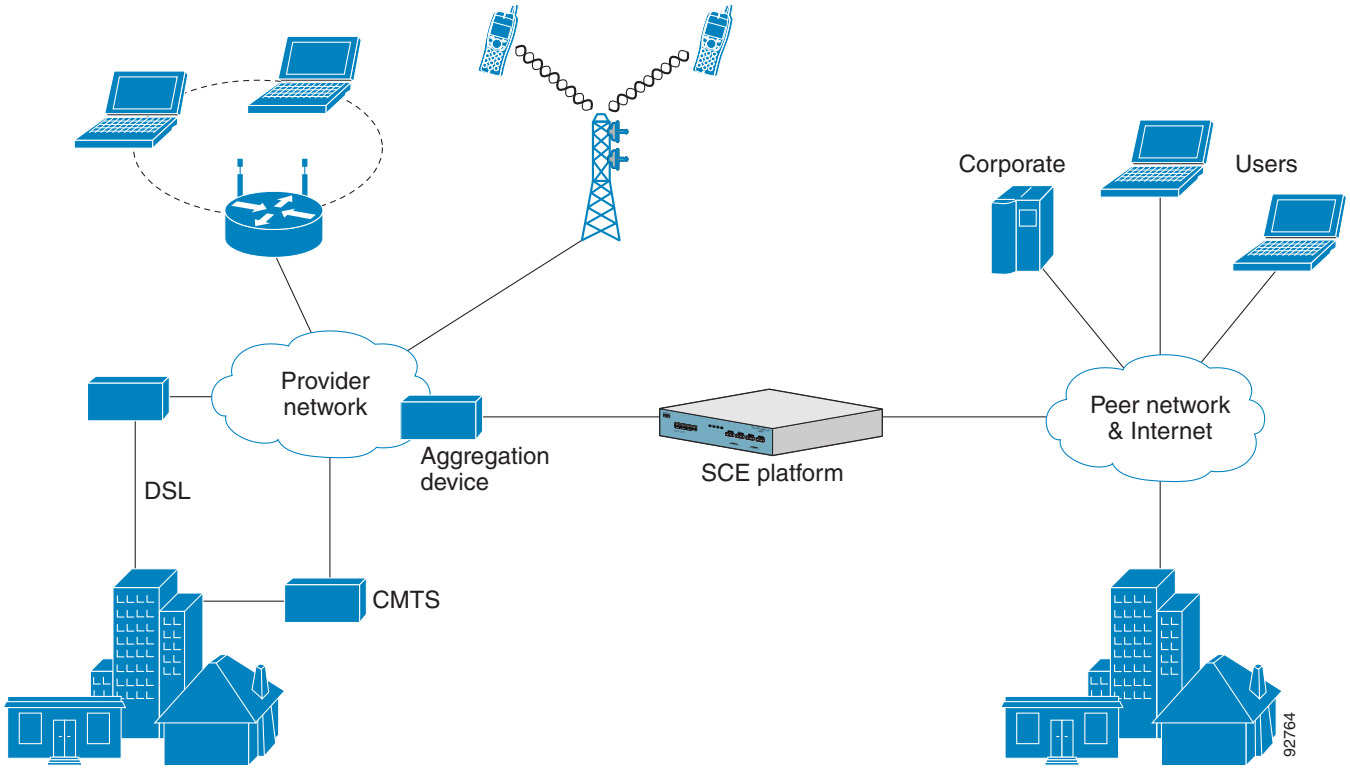
SCE Platform Description

The SCE family of programmable network devices performs application-layer stateful-flow inspection of IP traffic, and controls the traffic based on configurable rules. The SCE platform is a network device that uses ASIC components and reduced instruction set computer (RISC) processors to exceed beyond packet counting and expand into the contents of network traffic. Providing programmable, stateful inspection of bidirectional traffic flows, and mapping these flows with user ownership, SCE platforms provide real-time classification of network use. The classification provides the basis of the SCE platform advanced traffic-control and bandwidth-policing functionality. Where most bandwidth control functionality ends, the SCE platform provides further control and shaping options, including:

- Layer 7 stateful wire-speed packet inspection and classification
- Robust support for more than 600 protocols and applications, including:
  - General—HTTP, HTTPS, FTP, Telnet, Network News Transfer Protocol (NNTP), Simple Mail Transfer Protocol (SMTP), Post Office Protocol 3 (POP3), Internet Message Access Protocol (IMAP), Wireless Application Protocol (WAP), and others
  - Peer-to-Peer (P2P) file sharing—FastTrack-KazaA, Gnutella, BitTorrent, Winny, Hotline, eDonkey, DirectConnect, Piolet, and others
  - P2P VoIP—Skype, Skinny, DingoTel, and others
  - Streaming and Multimedia—Real Time Streaming Protocol (RTSP), Session Initiation Protocol (SIP), HTTP streaming, Real Time Protocol (RTP) and Real Time Control Protocol (RTCP), and others
- Programmable system core for flexible reporting and bandwidth control
- Transparent network and BSS and OSS integration into existing networks
- Subscriber awareness that relates traffic and usage to specific customers

Figure 1-1 illustrates a common deployment of an SCE platform in a network.

Figure 1-1 SCE Platform in the Network



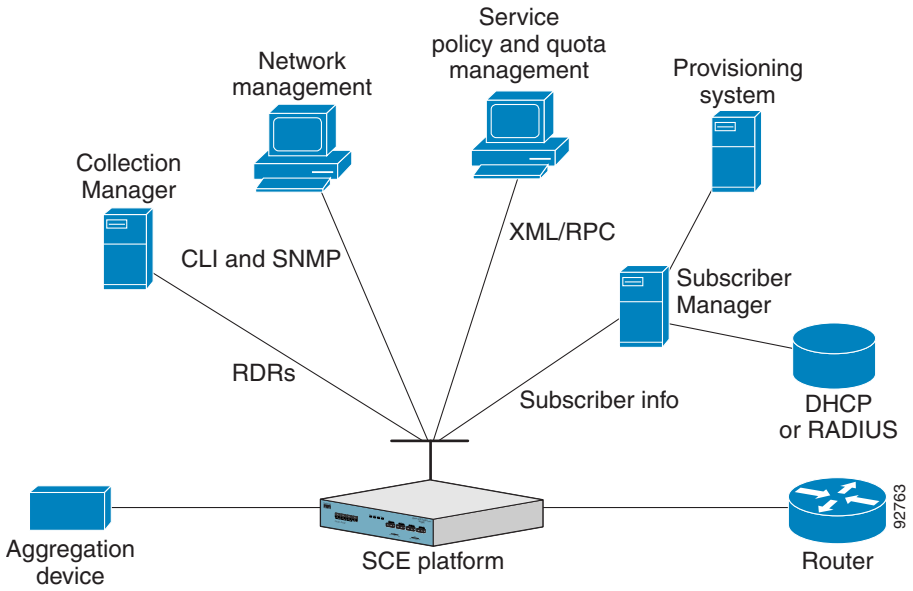
Management and Collection

The Cisco service control solution includes a complete management infrastructure that provides the following management components to manage all aspects of the solution:

- Network management
- Subscriber management
- Service Configuration management

These management interfaces are designed to comply with common management standards and to integrate easily with existing OSS infrastructure (Figure 1-2).

Figure 1-2 Service Control Management Infrastructure



Network Management

The Cisco service control solution provides complete network Fault, Configuration, Accounting, Performance, Security (FCAPS) Management.

Two interfaces provide network management:

- Command-line interface (CLI)—Accessible through the Console port or through a Telnet connection, the CLI is used for configuration and security functions.
- SNMP—Provides fault management (through SNMP traps) and performance-monitoring functionality.

Subscriber Management

Where the Cisco service control application for broadband (SCA BB) enforces policies on different subscribers and tracks usage on an individual subscriber basis, the Cisco service control management suite (SCMS) subscriber manager (SM) may be used as middleware software for bridging between OSS and SCE platforms. Subscriber information is stored in the SM database and can be distributed between multiple platforms according to actual subscriber placement.

The SM provides subscriber awareness by mapping network IDs to subscriber IDs. It can obtain subscriber information using dedicated integration modules that integrate with AAA devices, such as RADIUS or DHCP servers.

Subscriber information may be obtained in one of two ways:

- Push Mode—The SM pushes subscriber information to the SCE platform automatically upon logon of a subscriber.
- Pull Mode—The SM sends subscriber information to the SCE platform in response to a query from the SCE platform.

Service Configuration Management

Service configuration management is the ability to configure the general service definitions of a service control application. A service configuration file containing settings for traffic classification, accounting and reporting, and control is created and applied to an SCE platform. The SCA BB application provides tools to automate the distribution of these configuration files to SCE platforms. This standards-based approach makes it easy to manage multiple devices in a large network.

Service Control provides a GUI to edit and create these files and a complete set of APIs to automate their creation.

Data Collection

Data collection occurs as follows:

1. All analysis and data processing functions of the SCE platform result in the generation of Raw Data Records (RDRs), which the SCE platform forwards using a simple TCP-based protocol (RDR-Protocol).
2. RDRs are processed by the Cisco service control management suite collection manager.
3. The collection manager software is an implementation of a collection system that receives RDRs from one or more SCE platforms. It collects these records and processes them in one of its adapters. Each adapter performs a specific action on the RDR.

RDRs contain a variety of information and statistics, depending on the configuration of the system. Three main categories of RDRs include:

- Transaction RDRs—Records generated for each *transaction*, where a transaction is a single event detected in network traffic. The identification of a transaction depends on the particular application and protocol.
- Subscriber Usage RDRs—Records generated per subscriber, describing the traffic generated by that subscriber for a defined interval.
- Link RDRs—Records generated per link, describing the traffic carried on the link for a defined interval.

CHAPTER 2

Introduction to the Cisco SCE8000 Platform

This chapter provides an introduction to the Cisco SCE8000 10GBE platform, the Service Control hardware component.

Information About the SCE Platform

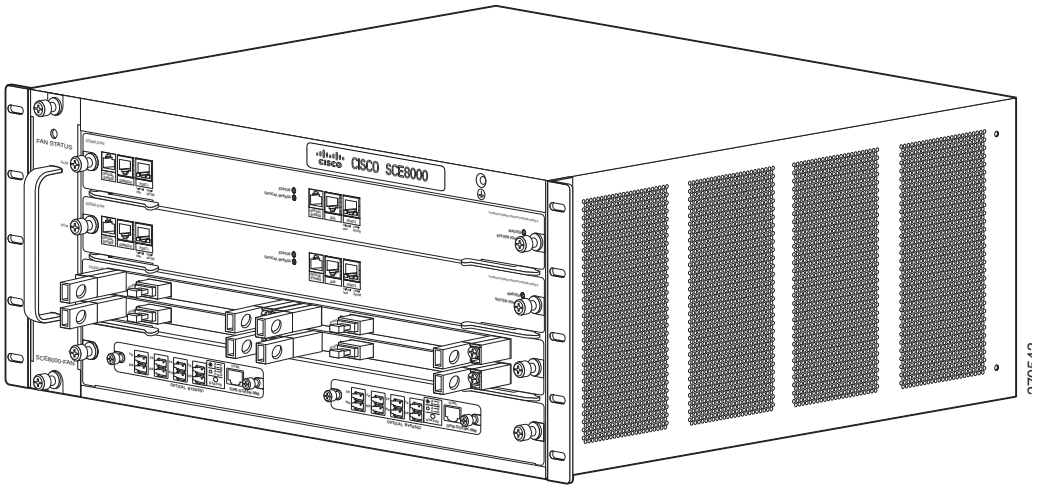
The Service Control Engine (SCE) platform, which is the hardware component of the Cisco Service Control solution, is designed to support observation, analysis, and control of Internet/IP traffic. The following table summarizes model information for the Cisco SCE8000 platform.

Table 2-1 SCE Platform Model Information

Model number	Cisco SCE8000 10GBE
Link Type	10 Gigabit Ethernet
Number of Ports	2 or 4
Number of Links	1 or 2

The Cisco SCE8000 is a transparent element with 10GBE links service throughput. It can be installed inline in the network where the entire traffic passes through it or in receive-only mode where it receives replication of the traffic through SPAN ports or optical splitters.

Figure 2-1 Cisco SCE8000 Platform



The Cisco SCE8000 supports the following network insertion models:

- single appliance (inline)
- single appliance (receive-only)
- cascade configuration
- MGSCP configuration

The Cisco SCE8000 platform is a 4-slot chassis hosting the following modules:

- One or two Service Control Modules (SCE8000-SCM-E) that each contain special purpose fast path chipset, traffic processors and control processor.
- One SPA Interface Processor card (SCE8000-SIP) that holds up to four SPA 10GBE interface modules.
- One optional optical bypass module hosting panel that holds up to two optical bypass modules.

In addition, the Cisco SCE8000 chassis contains two power supply modules in a 1+1 configuration, as well as a fan tray module.

Service Control Module (SCE8000-SCM-E)

The Cisco SCE8000 contains one or two SCE8000-SCMs located in slots#1 and #2 (the top two slots). The Service Control module contains ports and LEDs as shown in the following figure and tables.

Figure 2-2 SCE8000-SCM-E

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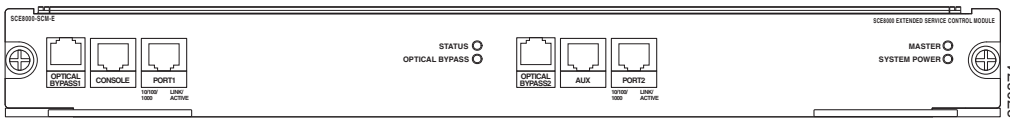


Table 2-2 SCE8000-SCM-E Ports

Port	Quantity	Description	Connect This Port To…
GBE port	2 Currently only one GBE port is supported.	Gigabit Ethernet RJ-45 ports for management of the Cisco SCE8000. CLI designation: interface GigabitEthernet 1/1, 1/2.	A LAN using a GBE cable with an RJ-45 connector.
Console	1	RS-232 RJ-45 port for use by technicians	A local terminal (console) using an RS-232 cable with an RJ-45 connector, as provided in the Cisco SCE8000 kit.
AUX	1	RS-232 RJ-45 port used by technicians	
Bypass	2	RJ-11 port	The Control connector on the optical bypass module.

Table 2-3 SCE8000-SCM-E LEDs

LEDs	Description
Power	• Steady green — Installed power supplies are functioning normally. • Steady amber — Only one power supply is functioning normally. • Unlit — No power from either power supply. On a slave SCE8000-SMC_E module (in the second slot), this LED is always off.
Status	The Status LED indicates the operational status of the Cisco SCE8000 system, as follows: • Unlit — No power from either power unit. • Steady amber — The system is booting up. • Flashing amber — The system is operational, but is in a warning state. • Flashing green — The system is fully operational. • Steady red — There is a problem or failure Note that Alarms are hierarchical: Failure takes precedence over Warning, which takes precedence over Operational.
Optical Bypass	• Steady amber — The optic bypass module has been directed to pass traffic via the Cisco SCE8000. • Unlit — The optic bypass module (if present) will connect the link fibers directly, and traffic will bypass the Cisco SCE8000. On a slave SCE8000-SMC_E module (in the second slot), this LED is always off. Note that this functionality is consistent even when the Cisco SCE8000 is powered down.

Table 2-3 SCE8000-SCM-E LEDs

LEDs	Description
Master	Indicates the master Service Control module • Steady green — Master Service Control module • Unlit — Slave Service Control module
Mng interface	The Mng interface LEDs indicate the operational status of the Cisco SCE8000 out-of-band LAN-based management port, as follows: • Link/Active Steady green — Port link is up Flashing green — Activity on the port link Unlit — Port link is down • Speed Unlit — Port is set to 10Mbps Steady green — Port is set to 100 Mbps Steady amber — Port is set to 1000 Mbps On a slave SCE8000-SMC_E module (in the second slot), this LED is always off.

Introduction to SIPs and SPAs

SIPs and SPAs are a new carrier card and port adapter architecture used to increase modularity, flexibility, and density across Cisco Systems routers for network connectivity. This section describes the SIPs and SPAs and provides some guidelines for their use.

SPA Interface Processors

The SIP module supported by the Cisco SCE8000 chassis is the SCE8000-SIP.

The following list describes some of the general characteristics of a SIP:

- A SIP is a carrier card that inserts into a slot in the chassis like a line card. It provides no network connectivity on its own.
- A SIP contains one or more subslots (bays), which are used to house one or more SPAs. The SPA provides interface ports for network connectivity.
- During normal operation the SIP should reside in the router fully populated either with functional SPAs in all subslots, or with a blank filler plate (SPA-BLANK=) inserted in all empty subslots.

Specifying the SIP Subslot Location for a SPA

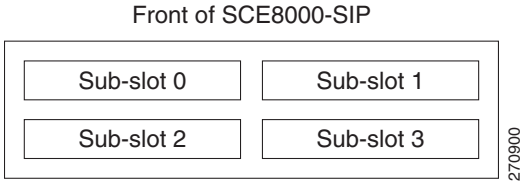
Cisco SCE8000-SIP subslots begin their numbering with "0" and have a horizontal orientation.

Figure 2-3 shows the subslot numbering for the Cisco SCE8000-SIP.

The Cisco SCE8000-SIP supports four subslots for the installation of SPAs, as follows:

- SIP subslot 0—Top–left subslot
- SIP subslot 1—Top–right subslot
- SIP subslot 2—Bottom–left subslot
- SIP subslot 3—Bottom–right subslot

Figure 2-3 SPA Module Subslot Location



Shared Port Adapters

The SPA supported by the Cisco SCE8000-SIP is the 1-Port 10-Gigabit Ethernet SPA, SPA-1X10GE-L-V2

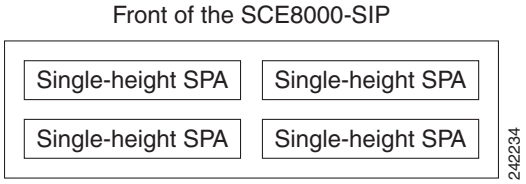
The following list describes some of the general characteristics of a SPA:

- A SPA is a modular type of port adapter that inserts into a subslot of a compatible SIP carrier card to provide network connectivity and increased interface port density. The Cisco SCE8000-SIP can hold up to four SPAs.

  Since the interfaces are connected in subscriber/network pairs, either two or four SPAs must be installed.

- The supported SPA is a single-height SPAs, which inserts into one SIP subslot. (See Figure 2-4.)

Figure 2-4 Single-Height SPA Size



- Each SPA provides a one 10GBE port, which is the interface to either subscriber or network traffic. These interfaces can be individually configured using the Cisco command-line interface (CLI).
- Either a blank filler plate or a functional SPA should reside in every subslot of an SIP during normal operation to maintain cooling integrity. Blank filler plates are available in single-height form only.

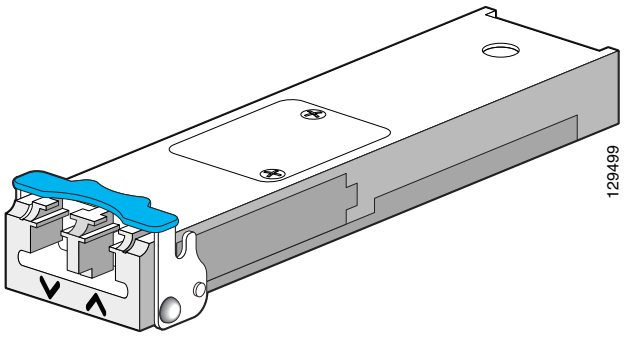
  Since the interfaces are connected in subscriber/network pairs, the SCE8000-SIP must be either fully populated or have both the bottom bays covered with blank filler plates.

Modular Optics

The SPAs implement 10GBE small form-factor pluggable (XFP) optical transceivers to provide network connectivity. An XFP module is a transceiver device that mounts into the front panel to provide network connectivity.

Note It is highly recommended only to use the XFP modules listed as supported in this document. Use of unsupported or unqualified XFP modules may affect reliability or operation.

Figure 2-5 10GBE Small Form-factor Pluggable (XFP)



The interface connector on the 1-Port 10-Gigabit Ethernet SPA is a fiber optic receiver that supports one XFP.

The types of optics modules that have been qualified for use with the 1-Port 10-Gigabit Ethernet SPA on the Cisco SCE8000 platform are as follows:

- XFP-10GLR-OC192SR
- XFP-10GER-OC192IR
- XFP-10GZR-OC192LR
- XFP-10G-MM-SR

XFP Connections

The qualified XFPs include an optical transmitter and receiver pair integrated with Clock and Data Recovery (CDR) integrated circuits. The XFPs provide high-speed serial links at 10.3125 Gbps on single mode fibers.

The transmit side recovers and retimes the 10 Gbps serial data and passes it to a laser driver. The laser driver biases and modulates a laser, enabling data transmission over fiber through an LC connector. The receive side recovers and retimes the 10 Gbps optical data stream from a photo detector trans impedance amplifier and passes it to an output driver.

See the label on the XFP for technology type and model.

XFP dimensions are:

- Height 12.5 mm
- Width 18.35 mm
- Length 71.1mm

The XFP operating temperature range is 0°C to 70°C.

Table 2-4 XFP Port Cabling Specifications

XFP	Wavelength	Fiber Type
XFP-10GLR-OC192SR	1310 nm	SMF
XFP-10GER-OC192IR	1550 nm	SMF
XFP-10GZR-OC192LR	1550 nm	SMF
XFP-10G-MM-SR	850 nm	MMF

The SCE8000-SIP

Table 2-5 SCE8000-SIP LED

LEDs	Description
Status	• Green —Operational • Flashing Amber - Electrical bypass in operation • Red - Not initialized or failed • Unlit —No power

The 1-Port 10GBE SPA Interface Module

The SCE8000-SIP is installed in slot #3 of the Cisco SCE8000 chassis. It hosts up to four single-width, single-height 1-Port 10GBE SPA interface modules, but in the Cisco SCE8000, it must be configured with either two 1-Port 10GBE SPAs (in the top two subslots) or four 1-Port 10GBE SPAs, to provide interfaces for either one or two complete traffic links.

Figure 2-6 1-Port 10GBE SPA Interface Module

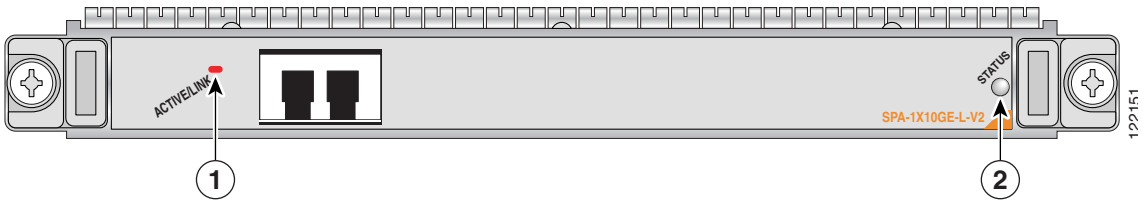


Table 2-6 SPA Ports

Port	Quantity	Description	Connect This Port To…
10 GBE Line port	1 on each SPA	Any one of the following: • XFP XFP-10GLR-OC192SR (10km) • XFP-10GER-OC192IR (40km) • XFP-10GZR-OC192LR (80km) • XFP-10G-MM-SR (200m) CLI designation: interface TenGigabitEthernet 3/0/0, 3/1/0/, 3/2/0, 3/3/0.	Any one of the following: • Subscriber side network component • Network side network component • Optical bypass 10GBE line port • 10GBE line port of a cascaded SCE8000 platform • EtherChannel port of a Cisco 7600 Series router (MGSCP topology) Refer to Connecting the Line Ports to the Network, page 6-1for further information.

Table 2-7 SPA LEDs

LEDs	Description
Active/Link (1)	• Green —Port is enabled by software and the link is up. • Amber — Port is enabled by software and the link is down. • Unlit — Port is not enabled by software.
Status (2)	The Status LED indicates the operational status of the SPA module, as follows: • Green — SPA is ready and operational. • Amber — SPA power is on and good, and SPA is being configured. • Off — SPA power is off.

The Cisco SCE8000 Optical Bypass

The Cisco SCE8000 platform optical bypass module preserves the service provider 10GBE links under all circumstances. At power failure the bypass is automatically activated. It can also be activated by the Cisco SCE8000 software.

The Cisco SCE8000 platform already includes an internal electrical bypass, but it is strongly recommended to use the optical bypass module for addressing the following scenarios:

- During platform reboot (SW reload)—If the external bypass module is not used, there is a 5-second period (at most) during which the link is forced down (cutoff functionality).

- During a power failure —The Cisco SCE8000 has two power supplies. A power failure occurs only when both of them fail.

In a case where the Cisco SCE8000 platform must be replaced, it is possible to remove the bypass modules from the SCE8000 chassis without disconnecting them from the network and then reinstall them in the new SCE platform, so that traffic links are preserved even in a case of complete failure and replacement of the Cisco SCE8000 platform. (See Replacing the Optical Bypass Module without Disrupting Traffic on the Link, page 9-26.)

Optical Bypass Functionality

The optical bypass module is connected bump-in-the-wire in the 10-GBE link. It is then connected to the Cisco SCE8000 platform with two types of connections:

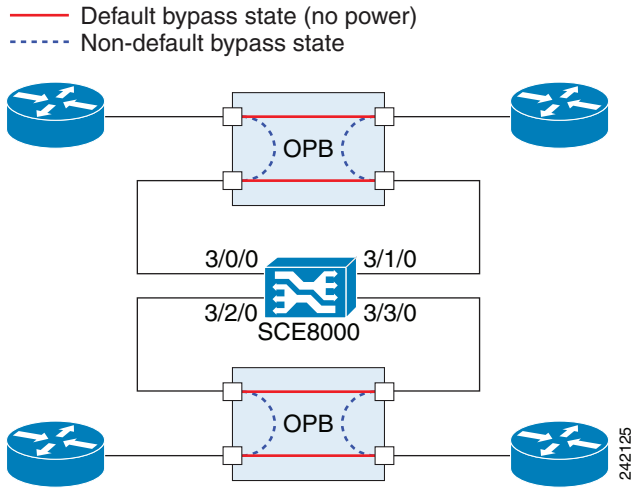
- 10GBE optical connections for data link traffic — 10 GBE connections from the optical bypass module to one pair of the 10GBE SPA ports.
- Control connection — Connection to the RJ-11 External Bypass connector on the SCE8000-SCM, so the optical bypass is activated if the Cisco SCE8000 platform fails.

Optical Bypass Module Connectivity

The optical bypass module functions as follows:

- Under normal conditions, the bypass module directs traffic to flow via the Cisco SCE8000.
- Under failure conditions, the optical bypass shortcuts the interfaces that are connected to the traffic link, and all traffic flows through the optical bypass module, bypassing the SCE platform.

Figure 2-7 Optical Bypass Module Connectivity



Optical Bypass Module (OPB-SCE8K)

There are two types of optical bypass modules to support different optic types:

- OPB-SCE8K-SM supports Single-Mode optics and should be used with SCE8000 equipped with Single-Mode optics.

- OPB-SCE8K-MM supports Multi-Mode optics and should be used with SCE8000 equipped with Multi-Mode optics.

The optical bypass module is installed either internally, in slot #4 of the Cisco SCE8000 chassis or in an external mounting panel in the rack.

Up to two optical bypass modules can be mounted internally, supporting inline insertion into two links.

Up to four optical bypass modules can be mounted using an external mount panel (OPB-SCE8K-EXT-PNL). A single panel can serve two SCE8000 platforms, each cutting two links or up to four SCE8000 platforms, each cutting a single link.

Figure 2-8 Optical Bypass Module

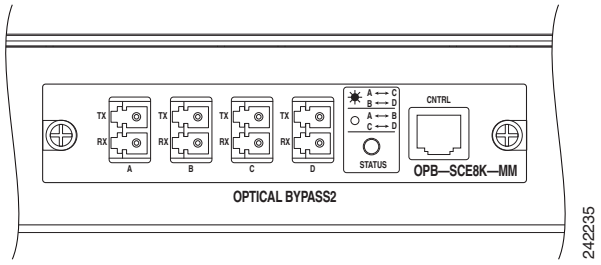


Table 2-8 Optical Bypass Module Ports

Port	Quantity	Description	Connect This Port To…
10 GBE Line port	4	10GBE ports A through D Duplex LC, panel mount adaptor for LC/UPC connectors	SPA interfaces on the Cisco SCE8000. Refer to Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-11 for further information.
CTRL	1	RJ-11 port	RJ-11 Optical Bypass port on the SCE8000-SCM-E

Table 2-9 Optical Bypass Module LEDs

LEDs	Description
Status	The Status LED indicates the operational status of the optical bypass module, as follows: • Green — Bypass module has been de-activated (traffic flows through the Cisco SCE8000 platform) • Off — Bypass module is active (traffic does not flow through the Cisco SCE8000 platform)

Optical Bypass Module Specifications

Fiber Cable Type

The fiber cable type within the Optical Bypass Module area as follows:

- OPB-SCE8K-MM: 50 um core.
- OPB-SCE8K-SM: SMF-28

Maximum optical path (fiber length of two ports) is 600m.

Switching Time

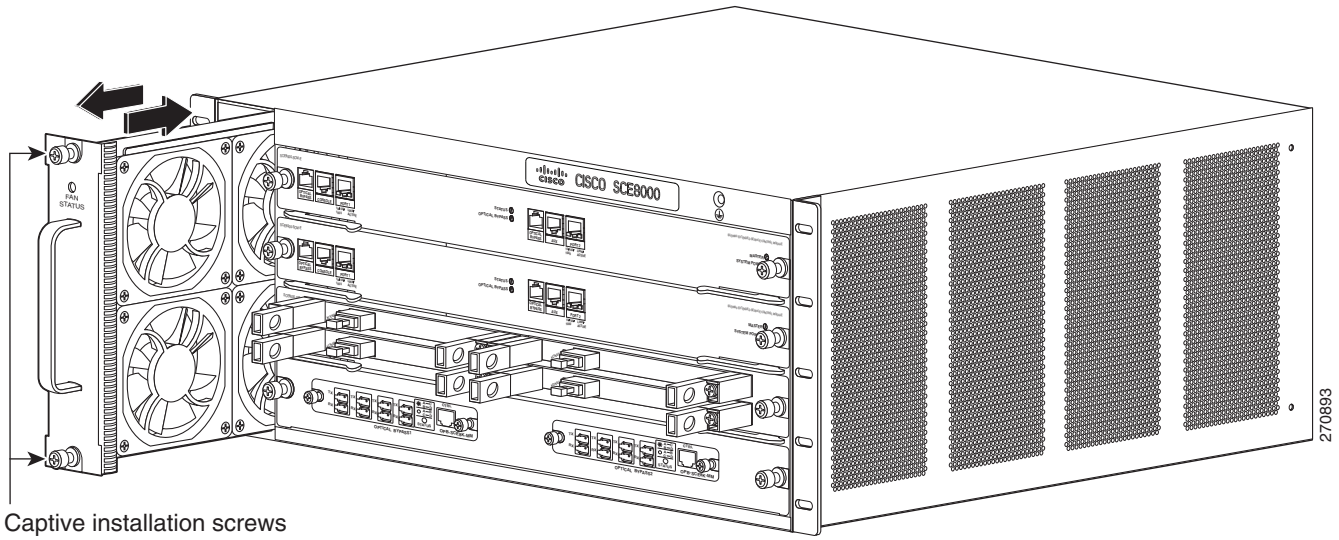
Switching time is measured from trigger to stable 90% optical output.

- Typical switching time: 3 ms
- Maximal switching time: 10ms

Fan Assembly

The system fan assembly, located in the chassis, provides cooling air for the installed modules. Sensors on the fan assembly and within the system monitor the internal air temperatures. If the air temperature exceeds a preset threshold, the environmental monitor displays warning messages.

Figure 2-9 Fan Assembly



If an individual fan within the assembly fails, the FAN STATUS LED turns red. To replace a fan assembly, see Removing and Replacing the Fan Assembly, page 9-10.

Power Supplies

The Cisco SCE8000 platform supports redundant AC- or DC-input power supplies. The following power supplies are available for the Cisco SCE8000 platform:

- 2700 W DC input (PWR-2700-DC/4): uses an external terminal block on the back side of the chassis for input power connection.
- 2700 W AC input (PWR-2700-AC/4): uses an external power cord directly connected to the AC power supply.

Figure 2-10 PWR-2700-AC/4

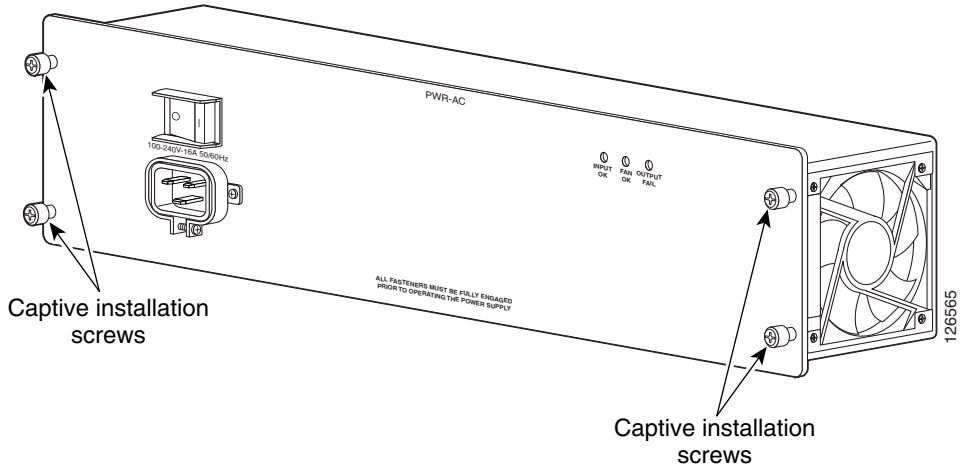
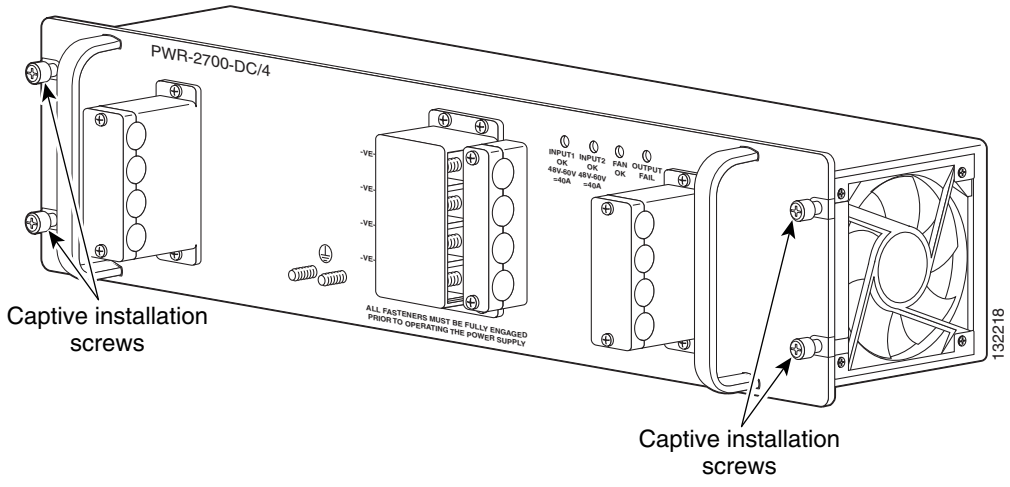


Figure 2-11 PWR-2700-DC/4



The AC-input and DC-input power supplies support redundancy. When power is removed from one supply, the redundant power feature causes the second supply to produce full power.

Power Supply Cooling

Power supplies have built-in fans and are completely self-cooling. Air enters from the right of the fan and exits through the left.

Load Sharing

With two power supplies, each power supply concurrently provides approximately half of the required power to the system. If one power supply fails, the second power supply immediately assumes full power to maintain uninterrupted system operation. The second power supply enables load sharing and fault tolerance automatically; no software configuration is required.

Checking the Shipping Container Contents

Use the Cisco SCE8000 Component List to check the contents of the Cisco SCE8000 platform shipping container.

Tip Do not discard the shipping container when you unpack the Cisco SCE8000. Flatten the shipping cartons and store them with the pallet. You will need these containers if you need to move or ship the Cisco SCE8000 in the future.

Cisco SCE8000 Component List

Table 2-10 Cisco SCE8000 Component List

Component	Description
Cisco SCE8000 platform	Cisco SCE8000 10GBE chassis configured with the following components:
Cisco SCE8000-SCM-E	Cisco SCE8000 Service Control Module
Cisco SCE8000-SIP	Cisco SCE8000 SPA Jacket card Interface Processor
2 or 4 SPA Jacket cards	SPA Interface. See below the list of supported SPA models.
2 or 4 XFP OpticsXFP optic modules.	See below the list of supported XFP models
2 Cisco PWR-2700-AC/4 or 2 Cisco PWR-2700-DC/4	Cisco power supply units, AC or DC. Hot swappable, redundant power supply, compatible with Cisco 7604 router.
SCE8000-FAN	Redundant fans unit.
Accessories	The following accessories might arrive in separate shipping containers:
Management cables	• Gigabit Ethernet cable for connecting to the Management ports • RS-232 serial cables (DB-9 to RJ-45 and DB-25 to RJ-45) for connecting to a local terminal
Power cables	Two AC power supply cords, if ordered with AC-input power supply units
Grounding kit 69-0815-01	• Grounding lug • Two M4 hex-head screws with locking washers
Optical Bypass module kit	• Optical Bypass Module • Control Cable (2 m) • Control Cable (40 cm)

Note Cisco does not ship the entire Cisco SCE8000 documentation set automatically with each system. You must specifically order the documentation as part of the sales order. If you ordered documentation and did not receive it, we will ship the documents to you within 24 hours. To order documents, contact a customer service representative.

Cisco SCE8000 Installation Checklist

To assist you with your installation and to provide a historical record of what was done by whom, photocopy the following Cisco SCE8000 Installation Checklist. Indicate when each procedure or verification is completed. When the checklist is completed, place it in your site log along with the other records for your new Cisco SCE8000 platform.

Table 2-11 Cisco SCE8000 Installation Checklist

Task	Verified By	Date
Date Cisco SCE8000 received		
Cisco SCE8000 and all accessories unpacked		
Safety recommendations and guidelines reviewed		
Topology verified: number of Cisco SCE8000 platforms, number of links, and whether inline or receive-only		
Installation Checklist copied		
Site log established and background information entered		
Site power voltages verified		
Site environmental specifications verified		
Required passwords, IP addresses, device names, and so on, needed for initial configuration available (refer to Initial Setup Parameters, page 5-2)		
Required tools available		
Network connection equipment available		
Cisco SCE8000 mounted in rack		
System grounding established, if required		
AC/DC power cables connected to AC/DC sources and Cisco SCE8000 chassis		
Optical bypass modules installed (optional)		
Console port set for 9600 baud, 8 data bits, no parity, and 1 stop bit (9600 8N1)		
ASCII terminal attached to console port		
Management port is operational		
Network interface cables and devices connected		
System power turned on		
System boot complete (Status LED is on)		
10 GBE line ports operational		
Correct hardware configuration displayed after system banner appears		

CHAPTER 3

Cisco SCE8000 Topology and Topology-Related Parameters

This chapter describes the possible deployment topologies of the Cisco SCE8000 and explains how to configure the relevant parameters correctly for each topology.

The Cisco SCE8000 Platform

The Cisco SCE8000 is a solution for dual links with load sharing and asymmetrical routing and support for fail-over between two SCE platforms.

The Cisco SCE8000 is built to support wire speed processing of full-duplex 10GBE streams. The Cisco SCE8000 can, therefore, be deployed in a multi-link environment, in several different topologies.

- Single Cisco SCE8000 topology — Provides the ability to process both directions of a bi-directional flow, processing both the upstream and downstream paths of a flow, even if they traverse different links.
- Dual Cisco SCE8000 topology (cascade) — Cascaded Cisco SCE8000s provide high-availability and fail-over solution and maintain the line and service in case of Cisco SCE8000 failure
- Multi-Gigabit Service Control Platform (MGSCP) topology — For scalability, the Cisco SCE8000 platform supports the option to connect a multiple number of SCE platforms to a Cisco 7600 Series router used to perform load-balancing between the platforms.

Topology Considerations

There are several issues that must be considered in order to arrive at the optimum configuration of the topology-related parameters:

- **Functionality**

— Will the system be used solely to monitor traffic flow, with report functionality only, or will it be used for traffic flow control, with enforcement as well as report functionality?

  - Monitoring and Control — The Cisco SCE8000 monitors and controls traffic flow. Decisions are enforced by the Cisco SCE8000 depending on the results of the monitoring functions of the Cisco SCE8000 and the configuration of the Service Control Application for Broadband or Mobile solution.

In order to perform control functions, the Cisco SCE8000 must be physically installed as an inline installation.

  - Monitoring only — The Cisco SCE8000 monitors traffic flow, but cannot control it.

Either an inline installation or an optical splitter or port SPAN installation may be used for monitoring only.

- **Size**

  A Cisco SCE8000 deployment can range from a single 10GBE link to multiple platforms in a MGSCP topology.

  A complete discussion on sizing the system is beyond the scope of this document. Information regarding the number of Cisco SCE8000 platforms required is related to the design considerations 'per link' (topology and redundancy factors) rather than to overall sizing of the system.

- **Redundancy**

  Must the system be designed to guarantee uninterrupted Cisco SCE8000 functionality? If so, there must be a backup Cisco SCE8000 platform (or a backup for each platform in an MGSCP topology) to assume operation in case of failure of the primary device.

  A backup SCE platform is connected in a cascade configuration with the primary SCE platform so that, although all processing is performed only in the active Cisco SCE8000, the standby Cisco SCE8000 is constantly updated with all the necessary information so that it can instantly take over processing the traffic on the data links should the active Cisco SCE8000 fail.

  Note that an MGSCP topology with multiple Cisco SCE8000 platforms provides more sophisticated redundancy options, but the basic decision on each link is the same: does it require a standby SCE platform or not?

- **Link continuity**

  How should the Cisco SCE8000 respond to platform failure with regard to link continuity? Should traffic flow continue even though the unit is not operating, or be halted until the platform is repaired/replaced?

  If link continuity is a high priority, an external optical bypass module can be installed on the link. (See Link Continuity, page 3-9 and The Cisco SCE8000 Optical Bypass, page 2-8.)

Note In cascade configuration, installation of an external optical bypass module is required.

These issues determine two important aspects of system deployment and configuration:

- Physical topology of the system — The actual physical placement and connection of the Cisco SCE8000 platform or platforms in the system.
- Topology-related configuration parameters — The correct values for each parameter must be ascertained before configuring the system to make sure that the system will function in the desired manner.

Physical Topologies

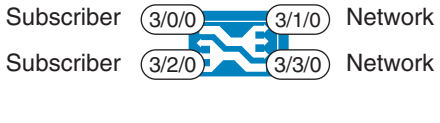
Following are descriptions of a number of physical topologies that the Cisco SCE8000 supports.

SCE8000 Interface Numbering

The following diagram shows the numbering of the SCE8000 interfaces as indicated in the topology diagrams in this chapter. The interface numbering is explained as follows:

- The first digit is the slot number (always 3).
- The second digit is the number of the sub-slot or SPA module (0-3).
- The third digit is the number of the interface on the designated SPA module (always 0).
- Interfaces 3/0/0 and 3/2/0 are on the two left-hand SPA modules and are the Subscriber side interfaces.
- Interfaces 3/1/0 and 3/3/0 are on the two right-hand SPA modules and are the Network side interfaces.

Figure 3-1 SCE8000 Interface Numbering



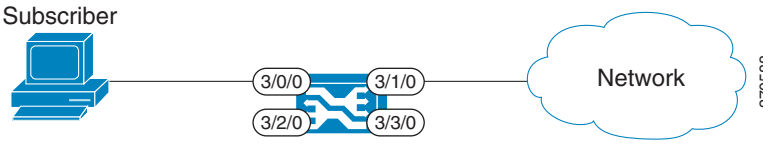
Single Cisco SCE8000 Topologies

A single Cisco SCE8000 supports both single 10GBE link and dual 10GBE link topologies.

Single Link: Inline Topology

Typically, the Cisco SCE8000 is connected in a full duplex 10GBE link between two devices (Router, BRAS, etc.). When the Cisco SCE8000 is installed as an inline installation, it physically resides on the data link between the subscribers and the network.

Figure 3-2 Single Link: Inline Topology



When configuring the Cisco SCE8000, an inline installation is referred to as "inline" connection mode.

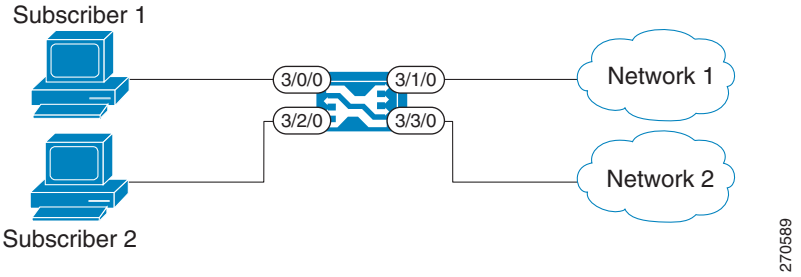
Dual link: Inline Installation

In this topology, one Cisco SCE8000 is connected inline in two full duplex, 10GBE links.

In case the two links are load-shared, asymmetrical routing might occur, and some of the flows may be split, that is, the upstream packets of the flow go on one link, and the downstream packets go on the other link.

When installed in this topology, the Cisco SCE8000 completely overcomes this phenomenon, and provides its normal functionality as if asymmetrical routing were not occurring in the two links.

Figure 3-3 Dual link: Inline Installation

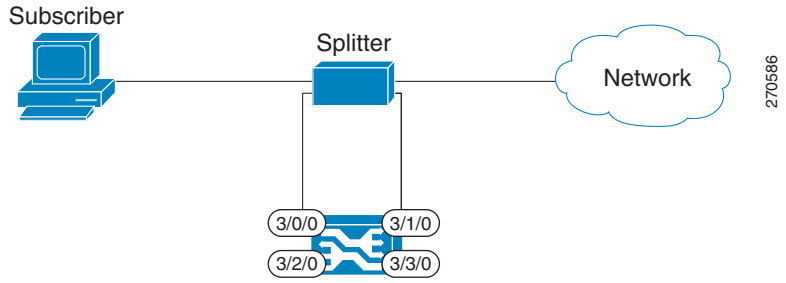


This topology supports both monitoring and control functionality, and is referred to as "inline" connection mode.

Single Link: Receive-only Topology

In this topology, an optical splitter resides physically on the 10GBE link between the subscribers and the network. The traffic passes through the optical splitter, which splits traffic to the Cisco SCE8000. The Cisco SCE8000, therefore, only receives traffic and does not transmit.

Figure 3-4 Single Link: Receive-only Topology



When configuring the Cisco SCE8000, an optical splitter topology is referred to as “receive-only” connection mode.

Note that in an optical splitter topology, the Cisco SCE8000 only enables traffic monitoring functionality.

Note When implementing receive-only topologies with a switch, the switch must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

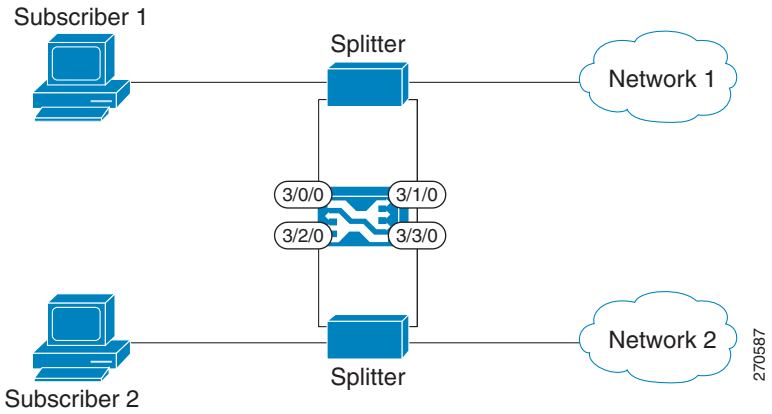
Dual Link: Receive-Only Topology

In this topology, one Cisco SCE8000 is connected in receive-only mode to two full duplex, 10 Gig links using optical splitters. If the two links are load-shared, asymmetrical routing might occur, and some of the flows may be split, i.e. the upstream packets of the flow go on one link, and the downstream packets go on the other link.

When installed in this topology, the Cisco SCE8000 completely overcomes this phenomenon, and provides its normal monitoring functionality as if asymmetrical routing were not occurring in the two links.

This installation supports monitoring functionality only, and is configured as “receive-only” connection mode.

Figure 3-5 Dual Link: Receive-Only Topology



Note When implementing receive-only topologies with a switch, the switch must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

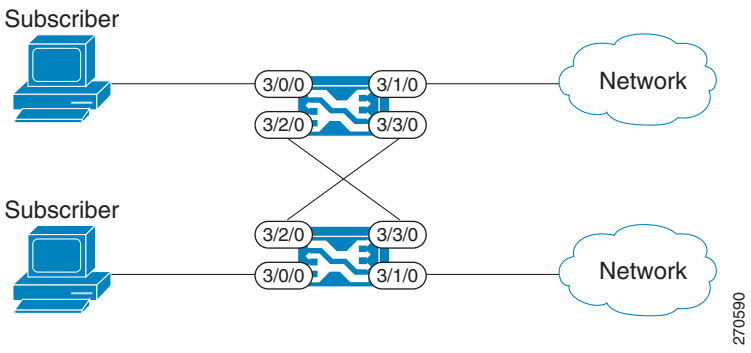
Dual Cisco SCE8000 Topology (Cascade)

In this topology, two cascaded Cisco SCE8000s are used. This allows a fail-over solution, where in case of a failure of one Cisco SCE8000 the functionality that the Cisco SCE8000 provides is preserved by the redundant platform.

This topology allows both control and monitoring functionality where redundancy is required and "inline" connection is used. The two Cisco SCE8000s are cascaded, so the primary Cisco SCE8000 processes the traffic of the two links, while the secondary Cisco SCE8000 only bypasses the traffic of its links to the primary Cisco SCE8000 for processing, and then bypasses the processed traffic back to the link. The two Cisco SCE8000s also exchange keep-alive messages and subscriber state information.

In case the primary Cisco SCE8000 fails, the two Cisco SCE8000s switch their roles, and this way fail-over is provided.

Figure 3-6 Two Cascaded Cisco SCE8000 Platforms



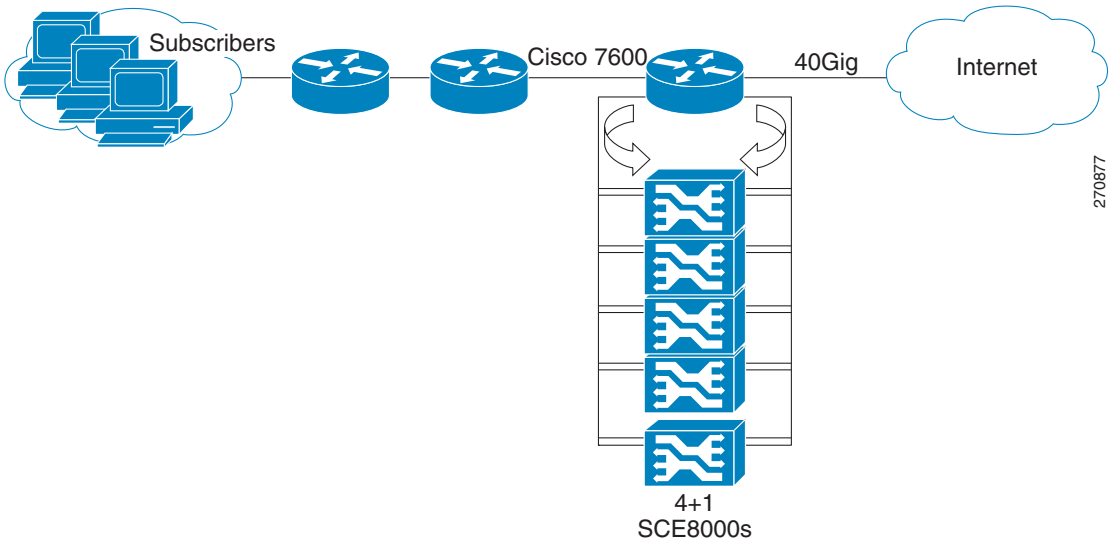
This fail-over solution preserves the Cisco SCE8000 functionality and the network link:

- The two Cisco SCE8000s are simultaneously aware of the subscriber contexts, and subscriber states are constantly exchanged between them, such that if the primary Cisco SCE8000 fails, the secondary can take over with minimum state loss.
- When one Cisco SCE8000 fails (depending on the type of failure) its link traffic is still bypassed to the functioning Cisco SCE8000 and processed there, so the traffic processing continues for both the links.
- The bypass of the traffic through the failed Cisco SCE8000 is configurable, and the user may choose to always cutoff the line that goes through the failed Cisco SCE8000. In this case network redundancy protocols like HSRP are responsible for identifying the line cutoff and switching all the traffic to go through the functioning Cisco SCE8000.
- In addition, it is possible to configure the Cisco SCE8000 to use the external optical bypass device so that in the event of any failure of the Cisco SCE8000, it will be used to provide link continuity. This ensures 100% link continuity at the expense of providing asymmetric routing functionality.

Multi-Gigabit Service Control Platform (MGSCP) Topology

In this topology, multiple Cisco SCE8000 platforms are connected to a Cisco 7600 Series router, which acts as a dispatcher between the platforms. The router contains two EtherChannels (ECs), one for the subscriber side and one for the network side, that perform load balancing for the SCE platform traffic. Traffic enters the first router, is distributed between the SCE platforms by the subscriber-side EC and then returns to the router so it can be forwarded to its original destination.

Figure 3-7 Basic MGSCP Topology



There are a number of variables to be considered in the MGSCP topology. Two of the main factors to be considered include:

- Type of SCE Platform Redundancy, page 3-8
- Redundant Cisco 7600 Series Router, page 3-8

Type of SCE Platform Redundancy

- **All Active**

  All ports in the EC and all SCE platforms are active. If there is a failure in one of the SCE platforms, the links on the related ports in the EC will be down and the EC will automatically exclude it from the load distribution. The load will then be distributed between the remaining active SCE platforms.

  Since the Cisco SCE8000 supports two links, this configuration requires one SCE platform per two links (two EC ports).

- **N+1**

  'N' SCE platforms are active and one platform is on standby. The EC ports connected to the standby SCE platform must be configured as standby ports. In the case of failure of one of the SCE platforms, the EC ports connected to the failing SCE platform are shut and the standby EC ports, connected to the standby SCE platform, will be activated.

  Since the Cisco SCE8000 supports two links, this configuration requires one SCE platform per two links (two EC ports), plus one extra SCE platform for standby.

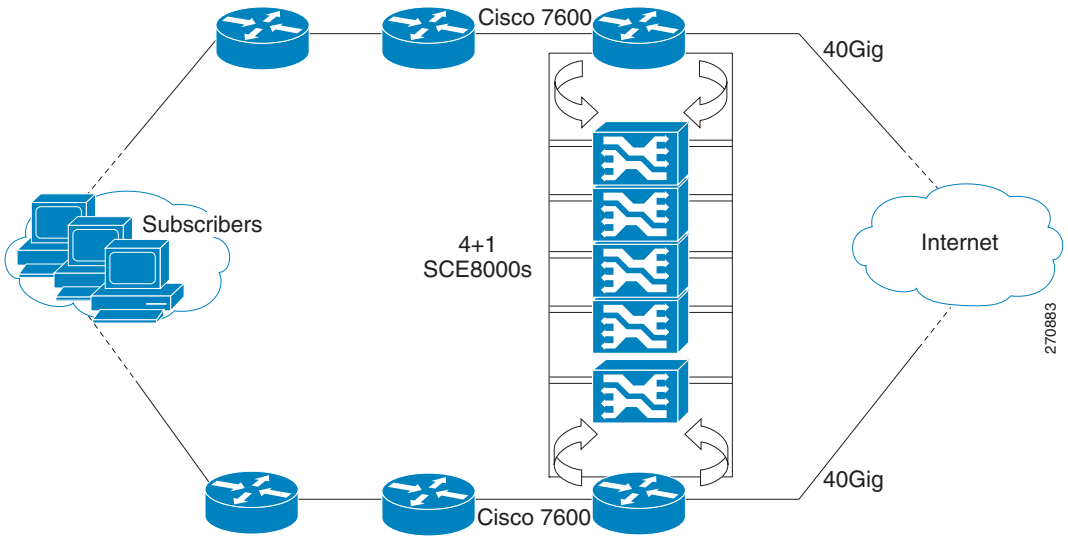
  Note that the standby SCE platform must be connected to the two highest-numbered ports, since EC behavior automatically designates these as the standby ports.

Redundant Cisco 7600 Series Router

Two Cisco 7600 Series routers can be used to provide network redundancy.

In this topology, one link on each Cisco SCE8000 platform is connected to each router. Therefore, one SCE platform is required for each link.

Figure 3-8 MGSCP with Redundant Router



Link Continuity

The internal bypass mechanism of the Cisco SCE8000 allows traffic to continue to flow, if desired, even if the device itself is not fully functioning. In addition, the Cisco SCE8000 is designed with the ability to control up to two external optical bypass devices (one per link). This is needed because the internal bypass mechanism cannot maintain traffic flow in all cases.

Note that when the Cisco SCE8000 is connected to the network through an optical splitter, a failure of the Cisco SCE8000 does not affect the traffic flow, as the traffic continues to flow through the optical splitter.

Internal Bypass Mechanism

The Cisco SCE8000 includes a SPA Interface Processor module with a bypass mechanism that is enabled upon Cisco SCE8000 failure.

The SPA Interface Processor card supports the following three modes:

- **Bypass** — The bypass mechanism preserves the network link, but traffic is not processed for monitoring or for control.
- **Forwarding** — This is the normal operational mode, in which the Cisco SCE8000 processes the traffic for monitoring and control purposes.
- **Cutoff** — There is no forwarding of traffic, and the physical link is forced down (cutoff functionality at layer 1).

The SPA Interface Processor card cannot preserve the link in the following circumstances:

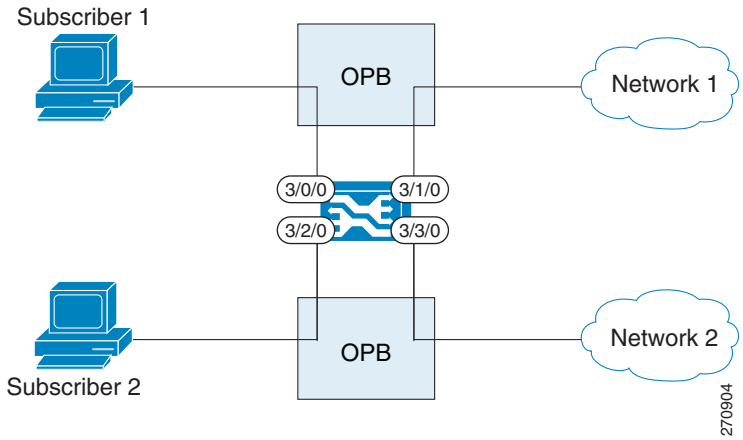
- During platform reboot (SW reload), there is a 5-second period (at most) during which the link is forced down (cutoff functionality).
- During a power failure (The Cisco SCE8000 has two power supplies. A power failure occurs only when both of them fail).
- Under certain types of failure within the SIP module, the SPA cards, or the XFP optic modules.

External Optical Bypass

In installations in which the limitations of the internal bypass are not acceptable, an external optical bypass device can be used to provide dependable link continuity. The external optical bypass device can be installed either inside the Cisco SCE8000 chassis or be rack-mounted externally. The external optical bypass device can also be controlled manually by specific CLI commands.

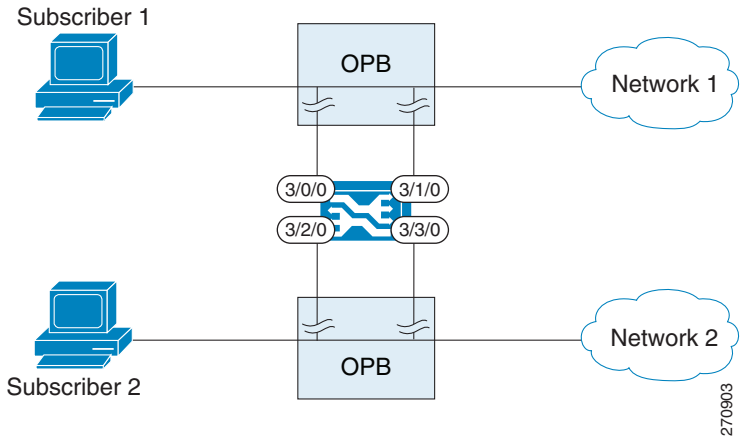
Under normal operating conditions, traffic flows through the link as usual, with the exception that the optical bypass module sits on the link.

Figure 3-9 Optical Bypass Under Normal Operating Conditions



If the SCE8000 platform fails, traffic flows through the optical bypass module, bypassing the SCE8000, so that traffic on the link is maintained

Figure 3-10 Optical Bypass Under Failure Conditions



Note In cascade configuration, installation of the optical bypass module is required

This optical bypass module can be added to link without altering the basic characteristics of the topology. (The installation procedure and the actual connections are somewhat different when the optical bypass module is used, see Optical Bypass Module Connectivity, page 6-8.)

For more information regarding the external bypass module, refer to The Cisco SCE8000 Optical Bypass, page 2-8.

Topology-Related Parameters

Refer to the following sections to determine the correct values for all topology-related parameters before beginning to run the initial setup of the Cisco SCE8000.

There are four topology-related parameters:

- **Connection mode** — Can be any one of the following, depending on the physical installation of the Cisco SCE8000 (Refer to Connection Mode Parameter, page 3-11):
  - Inline — single Cisco SCE8000 inline
  - Receive-only — single Cisco SCE8000 receive-only
  - Inline-cascade — two inline Cisco SCE8000 platforms cascaded
  - Receive-only-cascade — two receive-only Cisco SCE8000 platforms cascaded
- **Physically-connected-links** — In cascaded configurations, this parameter defines the number of the link connected to the Cisco SCE8000 platform being configured. (Refer to Physically Connected Links Parameter, page 3-12.)

  It is applicable only in a cascade topology.
- **Priority** — This parameter defines which is the primary Cisco SCE8000 (Refer to Priority, page 3-12.)

  It is applicable only in a cascade topology
- **On-failure** — This parameter determines whether the system cuts the traffic or bypasses it when the Cisco SCE8000 either has failed or is booting. Traffic bypass can be achieved either through the external optical bypass device or through the internal bypass mechanism of the SPA interface processor. It is not applicable to receive-only topologies. (Refer to On-Failure Mode Parameter, page 3-12.)

These parameters are configured via the **connection-mode** command.

Connection Mode Parameter

The connection mode parameter refers directly to the physical topology in which the Cisco SCE8000 is installed. The connection mode depends on two factors:

- **Inline/Receive-only**:
  - **Inline** — The Cisco SCE8000 resides on the data link between the subscriber side and the network side, thus both receiving and transmitting packets.
  - **Receive-only** — The Cisco SCE8000 does not reside physically on the data link. Data is forwarded to the Cisco SCE8000 via an external optical splitter. The Cisco SCE8000 itself receives only and does not transmit.
- **Cascade** — Indicates a two Cisco SCE8000 topology where the two Cisco SCE8000 platforms are connected via the cascade ports.

The connection mode parameter is determined by the physical deployment of the Cisco SCE8000, as follows:

- Single Cisco SCE8000 inline installation = **Inline** connection mode.
- Single Cisco SCE8000 optical splitter installation = **Receive-only** connection mode.
- Two-platform cascaded Cisco SCE8000 inline installation = **Inline-cascade** connection mode.
- Two-platform cascaded Cisco SCE8000 optical splitter installation = **Receive-only-cascade** connection mode

Physically Connected Links Parameter

A cascade topology supports two traffic links. This parameter defines which link is connected to which Cisco SCE8000 platform. The links are designated as follows:

- Link 0
- Link 1

Priority

In a cascade topology, the user must define the priority of each Cisco SCE8000.

- **Primary** — The Primary Cisco SCE8000 is active by default
- **Secondary** — The Secondary Cisco SCE8000 is the default standby.

Note that these defaults apply only when both devices are started together. However, if the primary Cisco SCE8000 fails and then recovers, it will not revert to active status, but remains in standby status, while the secondary device remains active

On-Failure Mode Parameter

The *on-failure* mode parameter configures the action taken by a failed box when a failure is detected.

As described in the section Internal Bypass Mechanism, page 3-9, the SPA Interface Processor card supports three different modes. The **Bypass** and **Cutoff** modes are possible when the Cisco SCE8000 is not operational due to platform failure or boot. The **Forwarding** mode enables control of traffic flow and is not compatible with the non-operational status.

The following *on-failure* modes are possible:

- **Bypass** — The SPA interface card forwards traffic between the two ports of each link with no intervention of the control application running in the Cisco SCE8000 platform. This is also known as 'electrical bypass'.

  In a cascade setup, this allows the traffic of the link connected to the failed box to be passed to the active box for processing.
- **Cutoff** — There is no forwarding of traffic. The link is forced down, resulting in traffic cutoff at Layer1.
- **External-bypass** – The external optical bypass device is used to bypass traffic, maintaining link continuity at all times.

In a single Cisco SCE8000 topology, the value of this parameter is determined by whether or not the link can be completely cut when the Cisco SCE8000 fails, or whether traffic flow should continue across the link in spite of platform failure. In the latter case, the **External-bypass** mode is the recommended setting, and is therefore the default value for the *on-failure* mode parameter.

In a dual cascaded Cisco SCE8000 topology, the default on-failure mode is Bypass, since it preserves full traffic processing functionality on both links in most single box failures (as long as the SPA interface card is functioning properly).

- **Cutoff** mode is suggested for the following:
  - Non-redundant inline topology if value-added services (such as security) are crucial and are more important than maintaining connectivity.
- **Bypass** mode is suggested for the following:
  - Non-redundant inline topology if connectivity is of high importance.
  - In redundant inline setups, if cutoff or traffic loss on a single link for a period of up to ten minutes (during a rare event of a SPA interface card failure) can be tolerated.
- **External-bypass** mode is suggested for the following:
  - Non-redundant inline topology if connectivity is crucial.
  - Redundant inline setups, if connectivity is crucial. Note that when this mode is used, the link connected to the failed box is not serviced, and the other link operates with asymmetric routing functionality.

Asymmetric Routing Topology

In some Service Control deployments, asymmetrical routing occurs between potential service control insertion points. Asymmetrical routing can cause a situation in which the two directions of a bi-directional flow pass through different SCE platforms, resulting in each SCE platform seeing only one direction of the flow (either the inbound traffic or the outbound traffic).

This problem is typically solved by connecting the two SCE platforms in cascade mode (or through an MGSCP cluster), thereby making sure that both directions of a flow run through the same SCE platform. However, this is sometimes not feasible, due to the fact that the SCE platforms sharing the split flow are geographically remote (especially common upon peering insertion). In this type of scenario, the asymmetric routing solution enables the SCE platform to handle such traffic, allowing SCA BB to classify traffic based on a single direction and to apply basic reporting and global control features to uni-directional traffic.

Asymmetric Routing and Other Service Control Capabilities

Asymmetric routing can be combined with most other Service Control capabilities, however there are some exceptions.

Service Control capabilities that cannot be used in an asymmetric routing topology include the following:

- Subscriber redirect
- Subscriber notification
- Any kind of subscriber integration. (Use subscriber-less mode or anonymous subscriber mode instead)

CHAPTER 4

Installing the Cisco SCE8000 Chassis

This chapter describes how to install a Cisco SCE8000 chassis.

Warning **Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for the Cisco SCE8000 Platform*. This guide contains important safety information you should know before working with the system.**

Warning **Only trained and qualified personnel should be allowed to install, replace, or service this equipment.**

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.**

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.**

Warning **This unit is intended for installation in restricted access areas. A restricted access area can be accessed only through the use of a special tool, lock and key, or other means of security.**

Warning **There is the danger of explosion if the battery is replaced incorrectly. The battery is not a user-serviceable part.**

Warning **Class 1 laser product.**

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

Warning **Blank faceplates and cover panels serve three important functions: they prevent exposure to hazardous voltages and currents inside the chassis; they contain electromagnetic interference (EMI) that might disrupt other equipment; and they direct the flow of cooling air through the chassis. Do not operate the system unless all cards, faceplates, front covers, and rear covers are in place.**

Preparing for Installation

Safety

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Warning **Read the installation instructions before connecting the system to the power source.**

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.**

Site Requirements

This section provides site power requirements for the Cisco SCE8000 chassis. You should verify the site power prior to installation.

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and blades consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohm (Mohm).

Environmental Requirements

Ensure adequate spacing between racks using the information in the following table. Keep all of the vents clear of obstructions, including dust and foreign conductive material, and away from the exhaust ports of other equipment.

Table 4-1 Chassis Airflow Requirements

Airflow Intake	Airflow Exhaust	Air Filter Option	Minimum Clearance (walls)	Minimum Horizontal Separation
Right side	Left side	Not applicable	6 in (15 cm)	12 in (30.5)

Power Requirements

Warning **Read the installation instructions before connecting the system to the power source.**

Follow these requirements when preparing your site for the Cisco SCE8000 installation:

- The redundant power configuration provides a second, identical power supply to ensure that power to the chassis continues uninterrupted if one power supply fails or input power on one line fails.
- Connect each of the two power supplies to a separate input power source. If you fail to do this, your system might be susceptible to total power failure due to a fault in the external wiring or a tripped circuit breaker.
- To prevent a loss of input power, be sure that the total maximum load on each circuit supplying the power supplies is within the current ratings of the wiring and breakers.
- In some systems, you might use an uninterruptible power supply (UPS) to protect against power failures at your site. Avoid UPS types that use ferroresonant technology. These UPS types can become unstable with systems like the Cisco SCE8000, which can have substantial current draw fluctuations due to bursty data traffic patterns.

Power Connection Guidelines

This section provides the guidelines for connecting the Cisco SCE8000 AC and DC power supplies to the site power source.

- AC-Powered Systems, page 4-4
- DC-Powered Systems, page 4-10
- Site Planning Checklist, page 4-11

AC-Powered Systems

- Each chassis power supply should have its own dedicated branch circuit.
- The circuit must be protected by a dedicated two-pole circuit breaker.

  For North America, the circuit breaker should be rated at 20A.

  For everywhere else, the circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The AC power receptacles used to plug in the chassis must be the grounding type. The grounding conductors that connect to the receptacles should connect to protective earth ground at the service equipment.

Warning **Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.**

Warning **This product requires short-circuit (overcurrent) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.**

Table 2-5 lists the AC-input power cord options, specifications, and Cisco product numbers for the 2700 W AC-input power supplies. Table 2-5 also references power cord illustrations.

Table 4-2 AC-Input Power Cord Options

Locale	Part Number	Length	Plug Rating	Power Cord Reference Illustration
North America (locking)	CAB-GSR16-US(=)	14 feet (4.3m)	250VAC, 20A	Figure 4-1
Europe	CAB-GSR16-EU(=)	14 feet (4.3m)	250VAC, 16A	Figure 4-1
International	CAB-AC16A-90L-IN(=)	14 feet (4.3m)	250VAC, 16A	Figure 4-1
China	CAB-AC16A-CH=	14 feet (4.3 m)	250VAC, 16A	Figure 4-2
Continental Europe	CAB-AC-2500W-EU=	14 feet (4.3 m)	250VAC, 16A	Figure 4-3
International	CAB-AC-2500W-INT=	14 feet (4.3 m)	250VAC, 16A	Figure 4-4
Israel	CAB-AC-2500W-ISRL=	14 feet (4.3 m)	250VAC, 16A	Figure 4-5
Japan, North America (nonlocking plug) 200–240VAC operation	CAB-AC-2500W-US1=	14 feet (4.3 m)	250VAC, 16A	Figure 4-6
Japan, North America (locking plug) 200–240VAC operation	CAB-AC-C6K-TWLK=	14 feet (4.3 m)	250VAC, 16A	Figure 4-7
Japan, North America 100–120VAC operation1	CAB-7513AC=	14 feet (4.3 m)	125VAC, 20A	Figure 4-8
South Africa	CAB-7513ACSA=	14 feet (4.3 m)	250VAC, 16A	Figure 4-9
Switzerland	CAB-ACS-16=	14 feet (4.3 m)	250VAC, 16A	Figure 4-10
Australia, New Zealand	CAB-AC-16A-AUS=	14 feet (4.3 m)	250VAC, 16A	Figure 4-11
Power Distribution Unit (PDU(=)*	CAB-C19-CBN	14 feet (4.3 m)	250VAC, 16A	Figure 4-12

*The PDU power cable is designed for users who power their switch from a PDU. The end of the cable that plugs into the Cisco SCE8000 chassis has a C19 connector; the other end of the cable that plugs into the PDU has a C20 connector.

AC Power Cord Illustrations

This section contains the AC power cord illustrations.

Figure 4-1 AC Power Cord Plugs and Appliance Coupler for the 2700 W Power Supply

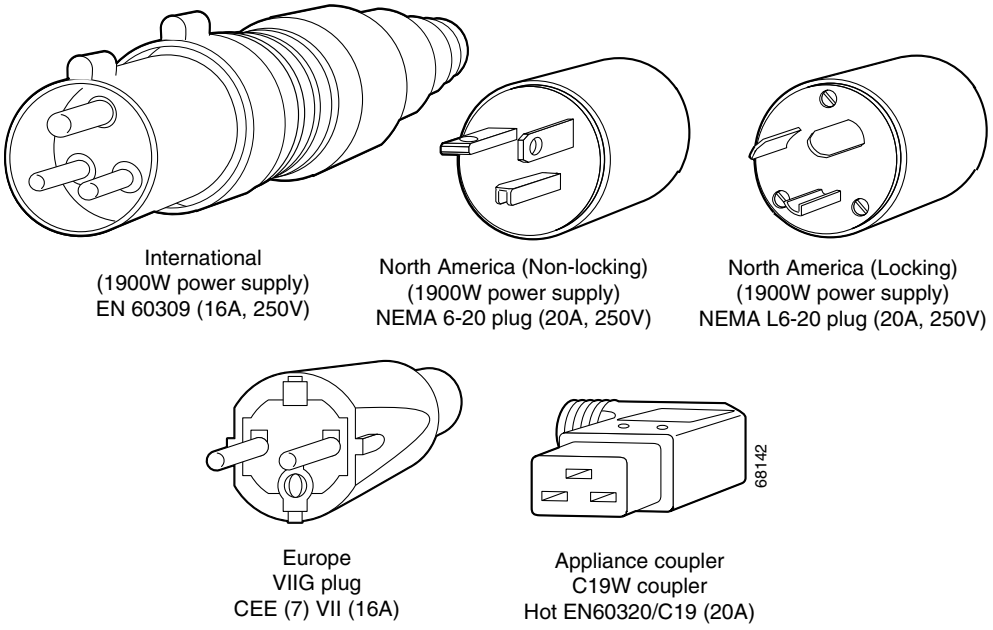


Figure 4-2 CAB-AC16A-CH=

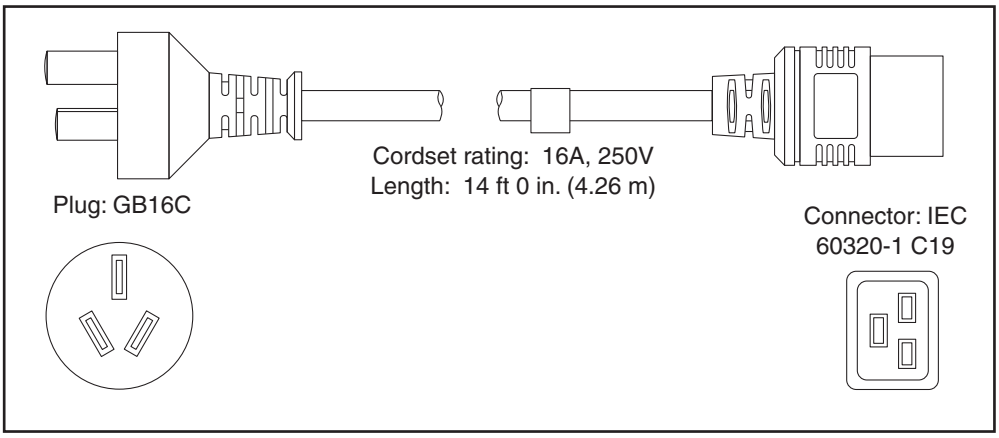


Figure 4-3 CAB-AC-2500W-EU=

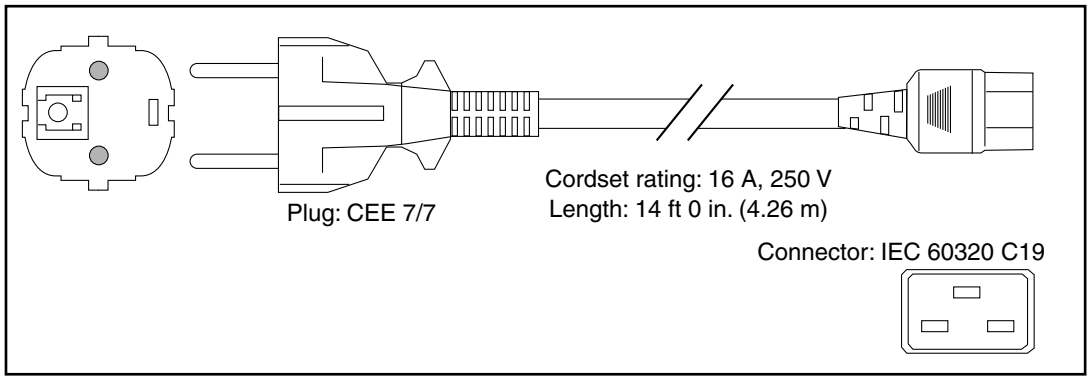


Figure 4-4 CAB-AC-2500W-INT=

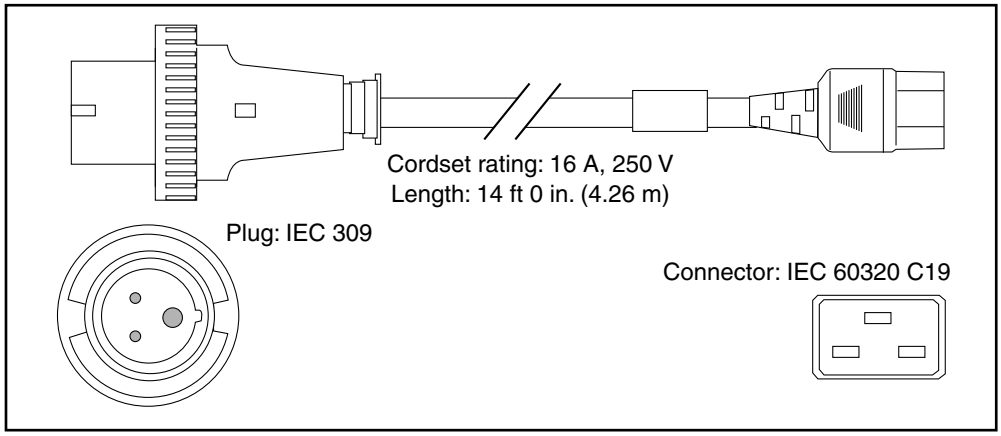


Figure 4-5 CAB-AC-2500W-ISRL=

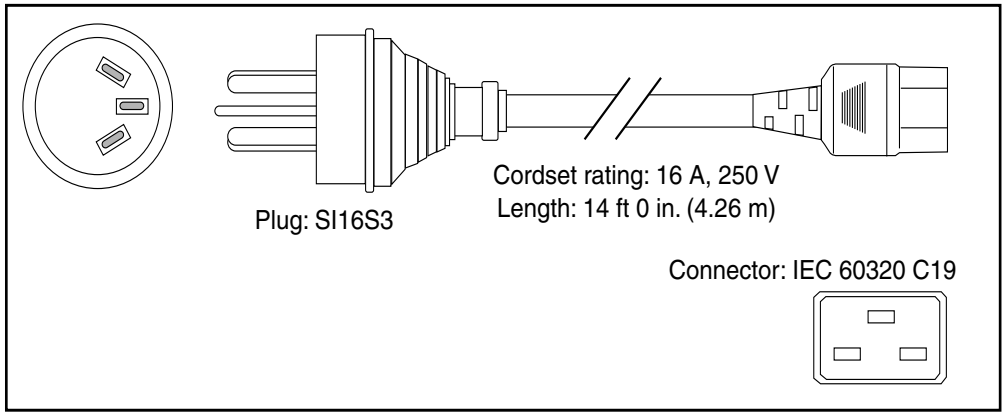


Figure 4-6 CAB-AC-2500W-US1=

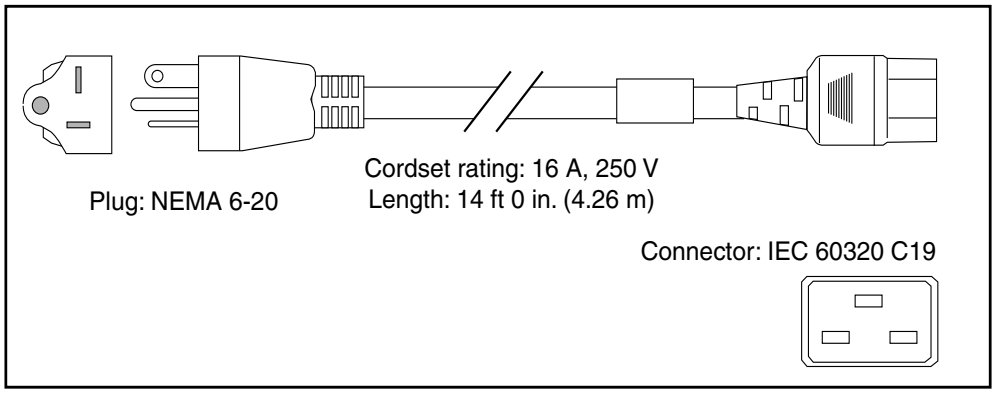


Figure 4-7 CAB-AC-C6K-TWLK=

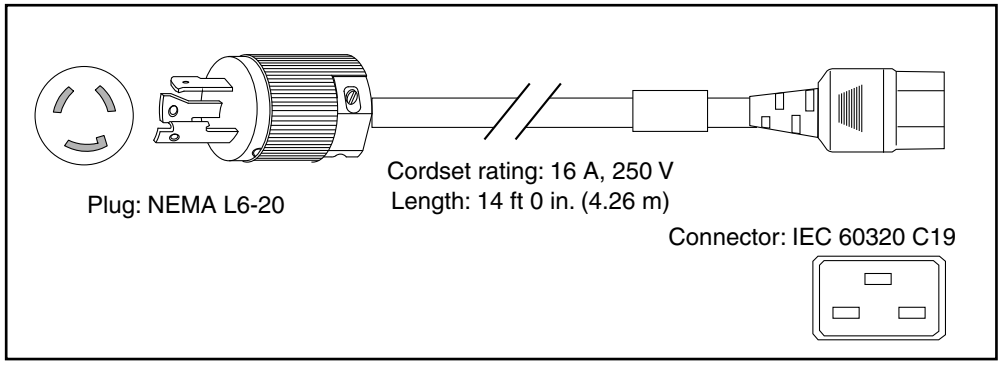


Figure 4-8 CAB-7513AC=

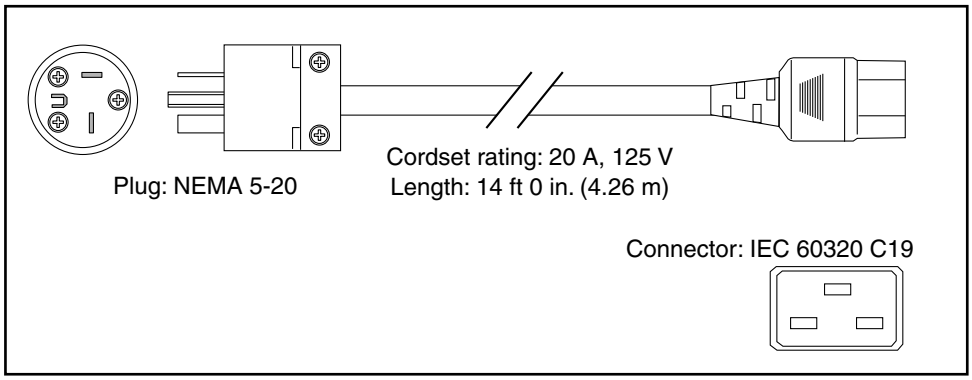


Figure 4-9 CAB-7513ACSA=

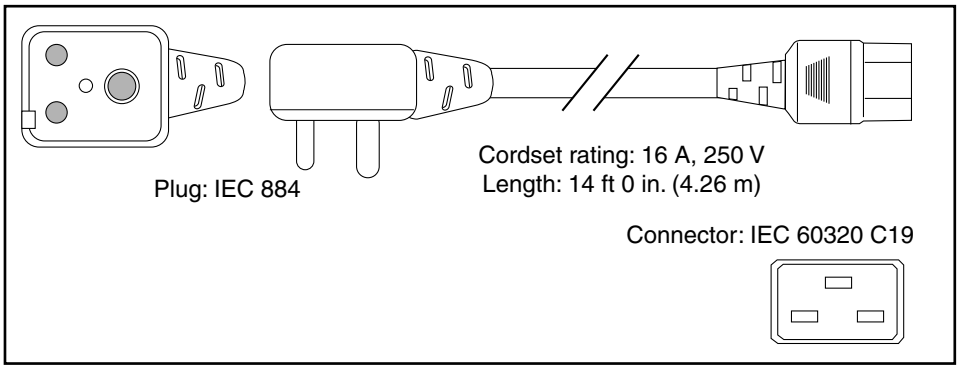


Figure 4-10 CAB-ACS-16=

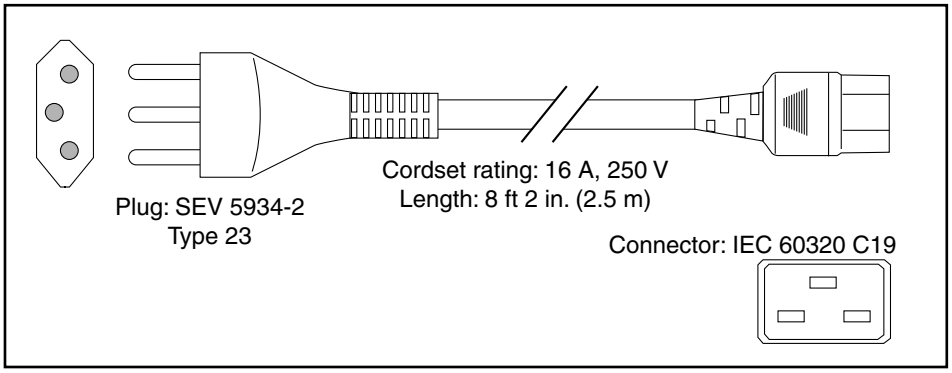


Figure 4-11 CAB-AC-16A-AUS

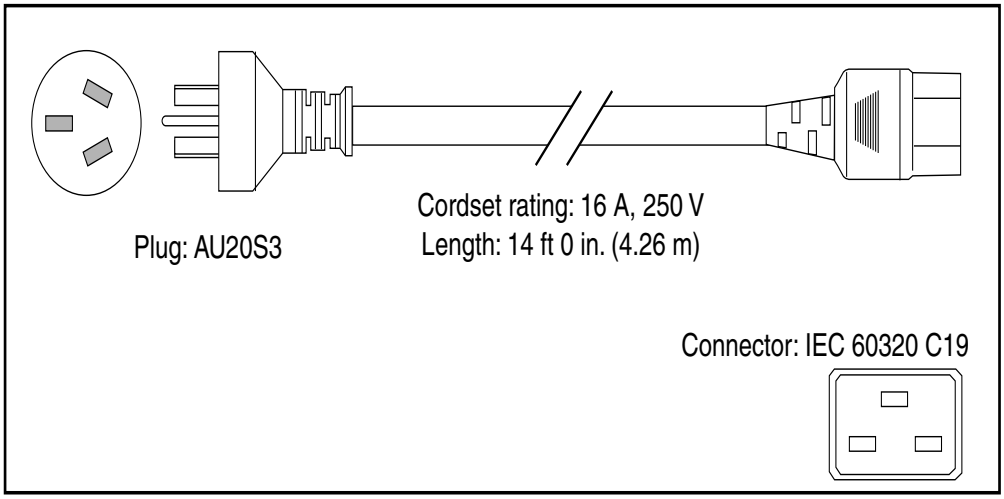
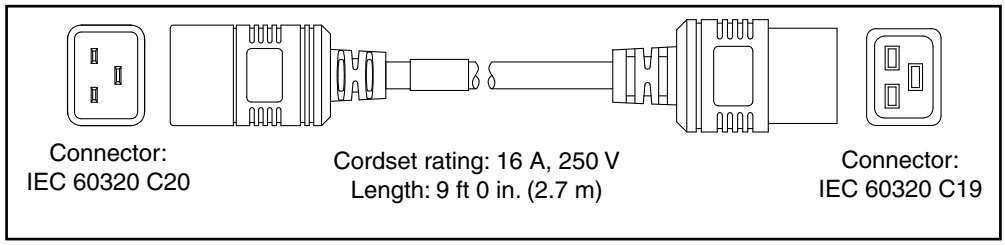


Figure 4-12 CAB-C19-CBN



DC-Powered Systems

Basic guidelines for DC-powered systems include the following:

- Each chassis power supply should have its own dedicated input power source. The source must comply with the safety extra-low voltage (SELV) requirements in the UL 60950, CSA 60950, EN 60950, IEC 60950 standards.
- The DC supplies each have the provision for a dual connection to the power source in order to permit high-power operation without exceeding current ratings. For the SCE8000, it is not necessary to connect both of these inputs to DC power sources; it is sufficient to connect only the '1' connections.
- Each circuit must be protected by a dedicated two-pole circuit breaker. The circuit breaker should be sized according to the power supply input rating and local or national code requirements.
- The circuit breaker is considered the disconnect device and should be easily accessible.
- The system ground is the power supply and chassis ground.

Caution Do not connect the DC-return wire to the system frame or to the system grounding equipment.

Site Planning Checklist

Table 2-6 lists the site planning activities that you should perform prior to installing the Cisco SCE8000 chassis. Completing each activity helps ensure a successful installation.

Table 4-3 Site Planning Checklist

Task No.	Planning Activity	Verified By	Time	Date
1	Space evaluation: Space and layout Floor covering Impact and vibration Lighting Maintenance access			
2	Environmental evaluation: Ambient temperature Humidity Altitude Atmospheric contamination Airflow			
3	Power evaluation: Input power type Power receptacles Receptacle proximity to the equipment Dedicated (separate) circuits for redundant power supplies UPS for power failures DC systems: Proper gauge wire and lugs			
4	Grounding evaluation: Circuit breaker size CO ground (AC- and DC-powered systems)			
5	Cable and interface equipment evaluation: Cable type Connector type Cable distance limitations			
6	EMI evaluation: Distance limitations for signaling Site wiring RFI levels			

Installing the Cisco SCE8000 Chassis in the Rack

This section describes how to install a Cisco SCE8000 platform in a rack. For first-time installations, perform the procedures in the following sections in the order listed:

Note Before starting the installation procedures in this chapter, see the Site Planning Checklist, page 4-11section to verify that all site planning activities were completed.

Unpacking the Cisco SCE8000 Chassis

Tip Do not discard the shipping container when you unpack the Cisco SCE8000. Flatten the shipping cartons and store them with the pallet. You will need these containers if you need to move or ship the Cisco SCE8000 in the future.

Perform the following to check the contents of the shipping container:

- Check the contents of the accessories kit against the list of accessories in the Cisco SCE8000 Component List, page 2-14 and the packing slip. Verify that you received all listed equipment, which should include the following:
  - Hardware and software documentation, if ordered
  - Optional equipment that you ordered, such as network interface cables, transceivers, or special connectors
- Check the modules in each slot. Ensure that the configuration matches the packing list and that all the specified interfaces are included.

Installation Guidelines

Before installing the chassis, ensure that the equipment rack complies with the following guidelines:

- The width of the rack, measured between the two front mounting strips or rails, must be 17.75 inches (45.09 cm)
- The depth of the rack, measured between the front and rear mounting strips, must be at least 19.25 inches (48.9 cm) but not more than 32 inches (81.3 cm)
- The rack must have sufficient vertical clearance to insert the chassis. The height of the Cisco SCE8000 chassis is 8.7 inches (22.09 cm) (5 RU).

If the rack is on wheels, ensure that the brakes are engaged or that the rack is otherwise stabilized.

Note We recommend that you maintain a minimum air space of 6 inches (15 cm) between walls and the chassis air vents and a minimum horizontal separation of 12 inches (30.5 cm) between two chassis to prevent overheating.

The installation hardware is not suitable for use with racks with obstructions (such as a power strip) that could impair access to field-replaceable units (FRUs).

Warning **To prevent bodily injury when mounting or servicing this unit in a rack, you must take special precautions to ensure that the system remains stable. The following guidelines are provided to ensure your safety:**
>This unit should be mounted at the bottom of the rack if it is the only unit in the rack.
>When mounting this unit in a partially filled rack, load the rack from the bottom to the top with the heaviest component at the bottom of the rack.
>If the rack is provided with stabilizing devices, install the stabilizers before mounting or servicing the unit in the rack.

Required Tools

These tools and equipment are required to install the chassis in the rack:

- Number 1 and number 2 Phillips-head screwdrivers
- 3/16-inch flat-blade screwdriver
- Tape measure and level
- Masking tape or some other method of marking the desired installation height in the rack

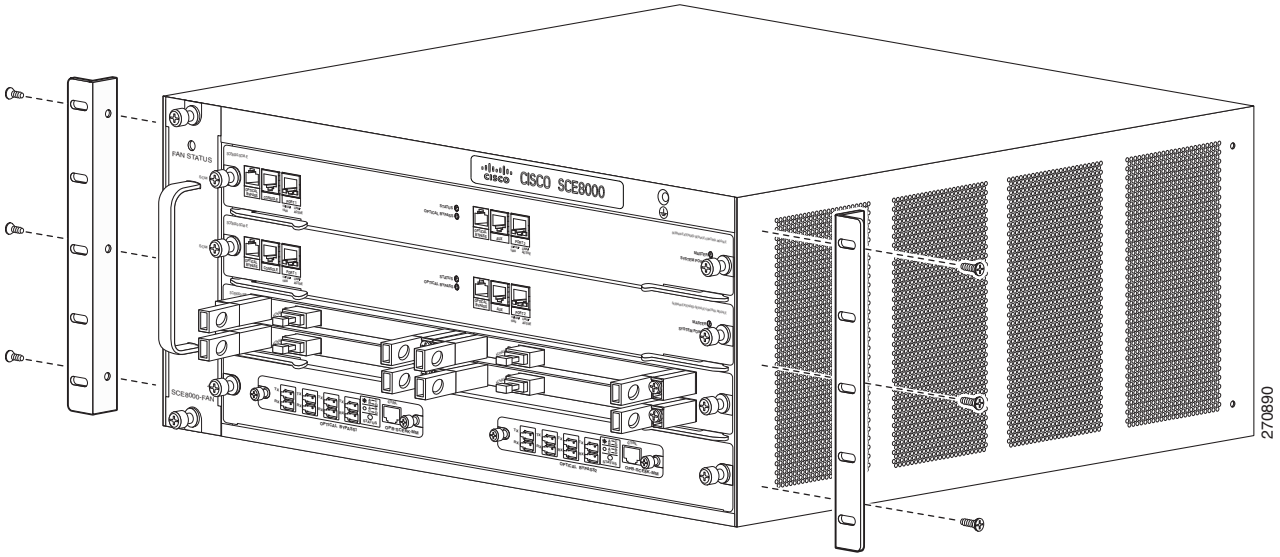
Installing the Chassis Brackets

The chassis is shipped with the mounting brackets installed on the front of the chassis. These brackets can be installed on the rear of the chassis.

To install the brackets on the rear of the chassis, perform these steps:

Step 1 Remove the screws that secure the brackets to the chassis.

Figure 4-13 Brackets on Cisco SCE8000 Chassis



Step 2 Position one of the brackets against the chassis side, and align the screw holes.

Step 3 Secure the bracket to the chassis with the screws removed in Step 1.

Step 4 Repeat Steps 2 and 3 for the other bracket.

Installing the Chassis in the Rack

Caution To prevent personal injury or damage to the chassis, never attempt to lift or tilt the chassis using the handles on modules (such as power supplies, fans, or cards); these types of handles are not designed to support the weight of the unit. Lift the unit only by grasping the chassis underneath its lower edge.

To install the Cisco SCE8000 chassis in the equipment rack, perform these steps:

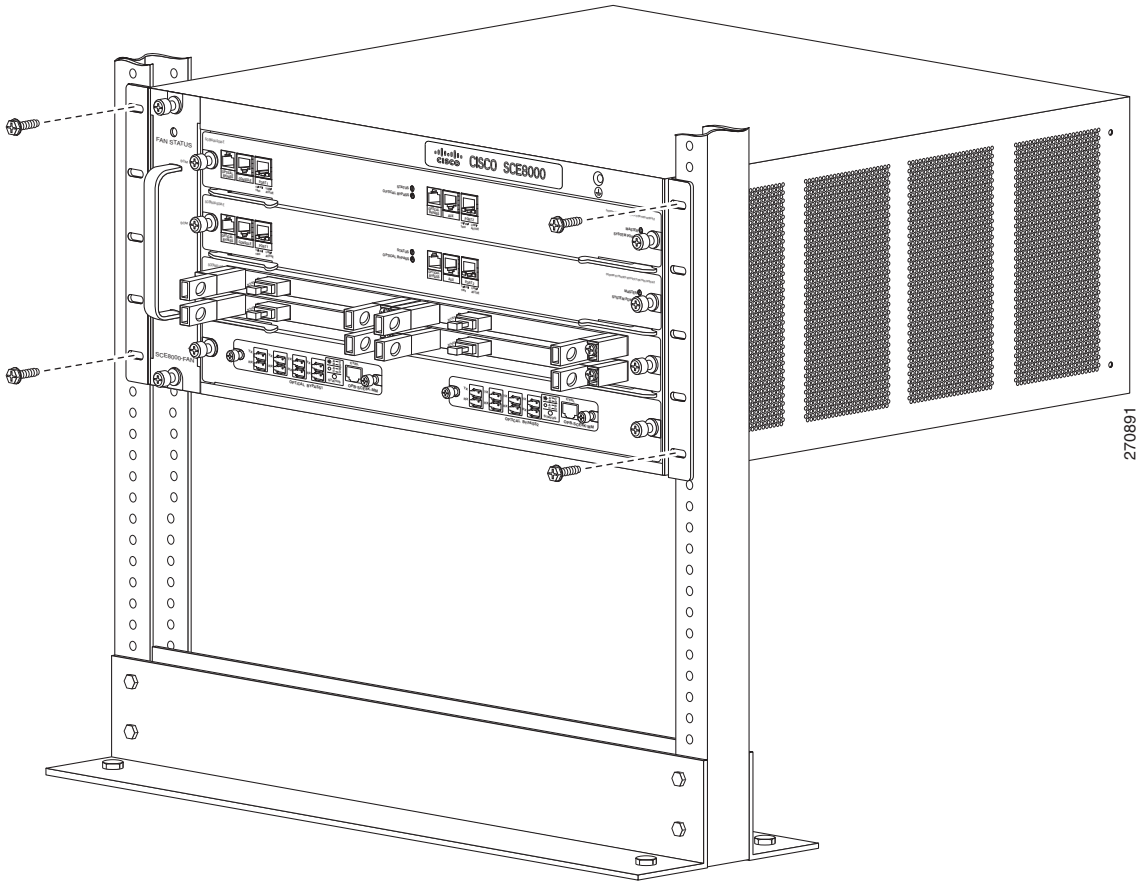
Step 1 Position the chassis in the rack as follows:

- If the front of the chassis (front panel) is at the front of the rack, insert the rear of the chassis between the mounting posts.
- If the rear of the chassis is at the front of the rack, insert the front of the chassis between the mounting posts.

Step 2 Align the mounting holes in the bracket (and optional cable guide) with the mounting holes in the equipment rack.

Step 3 Use a tape measure and level to choose and mark the position that the chassis is to be installed in the rack. Make a mark at equal height on both sides of the rack. This will help ensure that the chassis will be installed straight and level.

Figure 4-14 Installing the Cisco SCE8000 Chassis in the Rack



Step 4 Install the eight (four per side) 12-24 x 3/4-inch or 10-32 x 3/4-inch screws through the holes in the bracket and into the threaded holes in the equipment rack posts.

Step 5 Use a tape measure and level to verify that the chassis is installed straight and level.

Installing an Optical Bypass Module

There are two installation options for the external bypass modules:

- Chassis mount panel—This panel is mounted on slot #4 of the SCE8000 chassis. It hosts two optical bypass modules, which will serve the two traffic links supported by one Cisco SCE8000 chassis.
- External mounting panel—This panel can be mounted in any 19" rack. It hosts up to four optical bypass modules, which will serve the four traffic links supported by two Cisco SCE8000 platforms.

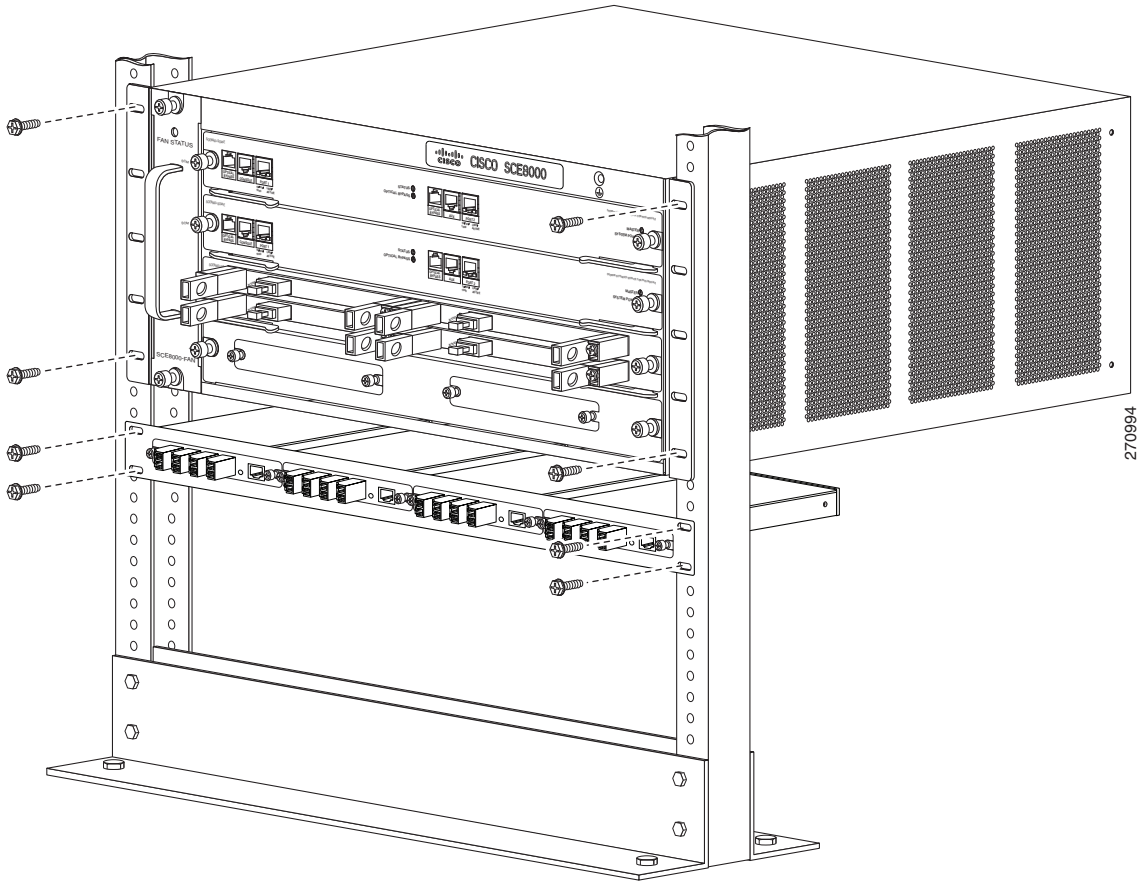
Step 1 For external mounting, install the external mounting panel in the 19" rack. Screw the mounting panel to the rack using four 3/4-inch screws, two on each side, through the holes in the mounting panel and into the threaded holes in the rack posts.

For internal mounting, the SCE8000 chassis will be shipped with the chassis mounting panel already installed in slot #4.

Step 2 Remove the module filler plate covering the subslot in the mounting panel by loosening the two screws.

Step 3 Carefully insert the optical bypass module into the subslot (there are no guide rails) and tighten the captive screws on either side of the module.

Figure 4-15 Optical Bypass Modules in External Mounting Panel



Connecting the System Ground

This section describes how to connect a system (earth) ground to the Cisco SCE8000 chassis.

Note You must connect the system ground on both AC- and DC-powered systems to an earth ground if this equipment is installed in a US or European Central Office.

Note For DC-powered systems, the system ground is also the power supply ground. The DC ground must be installed with a permanent connection to an earth ground according to NEC guidelines.

Two threaded M4 holes are provided on the chassis frame to attach the ground cable.

You must complete this procedure before connecting system power or turning on the Cisco SCE8000 chassis.

Required Tools and Equipment

To connect the system ground, you need the following tools and materials:

- One grounding lug.
- Two M4 (metric) hex-head screws with locking washers.

Note The grounding lug and M4 hex-head screws with locking washers are provided in kit 69-0815-01.

- One grounding wire.

  The grounding wire must be sized according to local and national installation requirements. Depending on the power supply and system, a 12 AWG conductor or larger size wire is required for U.S. installations.
- Number 2 Phillips-head screwdriver.
- Crimping tool (must be large enough to accommodate the girth of the grounding lug when crimping the grounding cable into the lug).
- Wire-stripping tool.

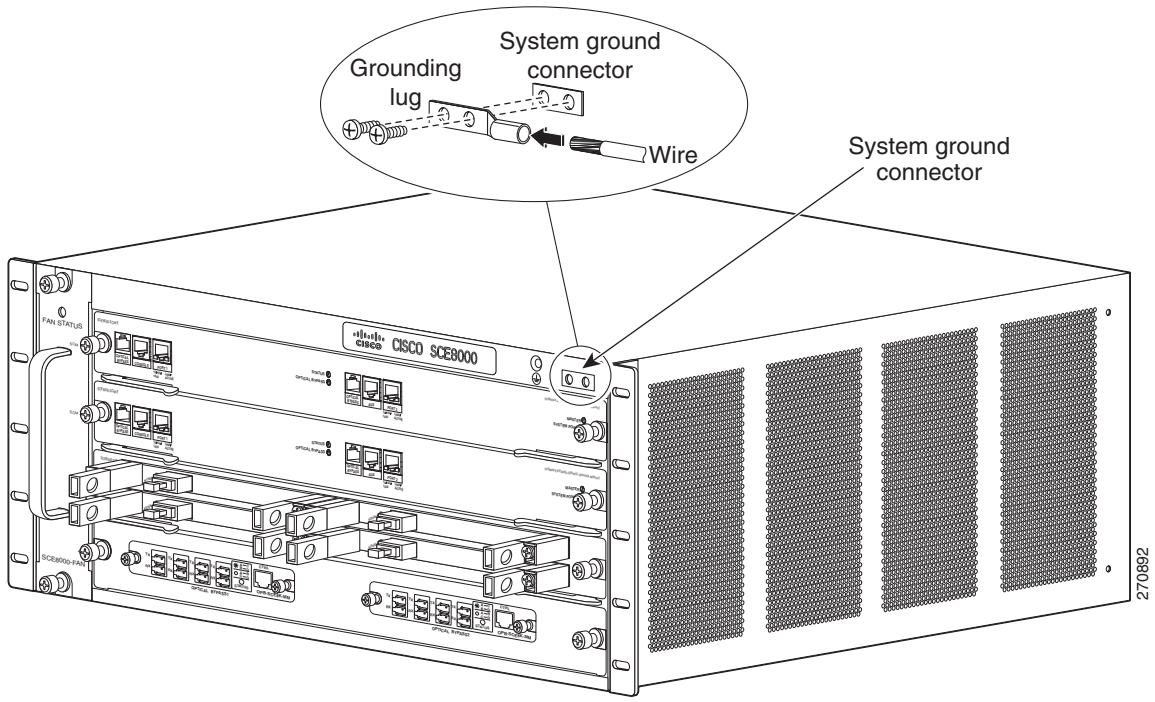
Step 1 Use a wire-stripping tool to remove approximately 0.75 inch (19 mm) of the covering from the end of the grounding wire.

Step 2 Insert the stripped end of the grounding wire into the open end of the grounding lug.

Step 3 Use the manufacturer recommended crimping tool to secure the grounding wire in place in the grounding lug.

Step 4 Locate and remove the adhesive label from the system grounding pad on the chassis.

Figure 4-16 Installing the System Ground



Step 5 Place the grounding wire lug against the grounding pad, making sure there is solid metal-to-metal contact.

Step 6 Secure the grounding lug to the chassis with two M4 screws. Ensure that the grounding lug will not interfere with other hardware or rack equipment.

Step 7 Prepare the other end of the grounding wire, and connect it to an appropriate grounding point in your site to ensure adequate earth ground for the Cisco SCE8000 chassis.

Installing the Power Supplies in the Cisco SCE8000 Chassis

The SCE8000 chassis is shipped with the power supplies (AC or DC) already installed. Should it be necessary to install a power supply module, refer to Removing and Replacing the Power Supply, page 9-3.

CHAPTER 5

Connecting the Management Interfaces

This chapter explains how to connect the SCE8000 Service Control Module (SCE8000-SCM-E) to a local console and perform the initial system configuration via the setup wizard that runs automatically.

Additionally, this chapter contains instructions for cabling the Gigabit Ethernet Management interfaces.

The Console interface (CON) as well as the Gigabit management interface (Port1) are located on the SCE8000-SCM-E located in slot# 1 of the Cisco SCE8000 chassis (see Service Control Module (SCE8000-SCM-E), page 2-2).

How to Set Up the Local Console

Even if you will be managing the Cisco SCE8000 from a remote location, you must first connect the unit to a local console and configure the initial settings for the Cisco SCE8000 to support remote management. When the initial connection is established, the setup utility will run automatically, prompting you to perform the initial system configuration.

This section provides instructions for setting up your local terminal at your workstation, to enable you to perform the initial system configuration of the Cisco SCE8000 system using the setup utility.

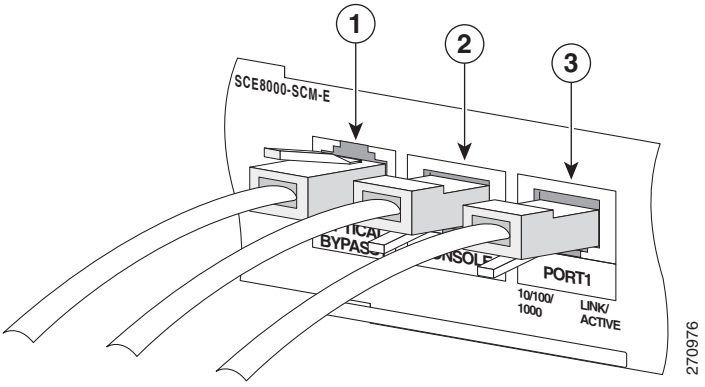
Make sure that the terminal configuration is as follows:

- 9600 baud
- 8 data bits
- No Parity
- 1 stop bits
- No flow control

The above Cisco SCE8000 port parameters are fixed and are not configurable.

Step 1 Plug the RS-232 serial cable provided with the Cisco SCE8000 into the CON port on the front panel of the SCE8000-SCM-E. (See item #2 in Figure 5-1 below.)

Figure 5-1 Connecting the Local Console to the SCE8000-SCM-E CON Port



Make sure that you push on the RJ-45 connector (attached to the RS-232 serial cable) until you hear a "click", which indicates that the connector is fully inserted and secured in the receptacle. Gently pull on the plug to confirm whether the plug is locked into the socket.

Step 2 Connect the other end of the serial cable (with an attached DB-9 or DB-25 connector) to the VT100 compatible local (serial) terminal.

Step 3 Make sure the local terminal is configured as a VT-100 terminal, according to the fixed Cisco SCE8000 CON port parameters.

Step 4 Make sure that the Cisco SCE8000 is powered-on, and has been allowed to complete booting (this process may take several minutes).

Step 5 Press **Enter** several times until the Cisco logo appears on the local terminal.

Initial Setup Parameters

At this point there are several basic global parameters that must be correctly configured in order for the SCE platform to communicate properly with the outside world. The following is a very brief summary of the initial setup parameters and commands. For more information, refer to the *Cisco SCE8000 Software Configuration Guide.*

- IP address and subnet mask of the Cisco SCE8000 platform itself. This is the IP address used by the GBE management interface.
- IP address of the default gateway.
- Hostname—The hostname is used to identify the SCE platform. It appears as part of the CLI prompt and is also returned as the value of the MIB-II object sysName.
  - The maximum length is 20 characters.
  - The default hostname is *SCE8000.*
- Passwords for user, admin and root level access. These are authorization-level passwords, not individual passwords. These passwords may be encrypted.

  Passwords must meet the following criteria:

  - Minimum length — 4 characters
  - Maximum length — 100 characters
  - Begin with an alpha character
  - May contain only printable characters
- The default password for all levels is *cisco*.
- System clock— Current date and time. The clock and the calendar must always be synchronized.
- Time zone—The name or ID of the time zone along with the number of hours offset from UTC.
- Domain name server—Default domain name, which is used to complete unqualified host names, as well as up to three domain name servers, which are used for DNS lookup.

  You must also enable DNS lookup.
- RDR formatter destination—The SCE platform generates Raw Data Records and sends them to the specified destinations (external collection systems) via the RDR formatter. You can configure up to eight RDR formatter destinations. Specify the IP address and port number for each destination.

The following table lists commands both for displaying the currently configured values and for configuring these parameters. It also lists the command mode for each configuration command. All **show** commands are executed from the User Exec command mode.

.

Table 5-1 Initial Setup Configuration

Parameter	show command	configuration command	configuration command mode
Management IP address and subnet mask	**show interface GigabitEthernet 1/1 ip address**	**ip address** *x.x.x.x subnet-mask*	GigabitEthernet Interface Configuration
Default gateway	**show ip default-gateway**	**ip default-gateway** *x.x.x.x*	Global Configuration
Hostname	**show hostname**	**hostname** *host-name*	Global Configuration
Authorization level passwords	N/A	**enable password level** *level [encryption-type] password*	Global Configuration
Clock	**show clock** **show calendar**	**calendar set** *hh:mm:ss day month year* **clock read-calendar** OR **clock set** *hh:mm:ss day month year* **clock update-calendar**	Privileged EXEC
Time zone	**show timezone**	**clock timezone** *zone-name offset-hours*	Global Configuration
Domain name server	**show hosts**	**ip domain-lookup** **ip domain-name** *domain-name* **ip name-server** *server-address1 [server-address2] [server-address3]*	Global Configuration
RDR formatter destination	**show rdr-formatter destination**	**rdr-formatter destination** *ip-address* **port** *port-number*	Global Configuration

Connecting the Management Interface

The SCE8000-SCM-E is equipped with one active RJ-45 management port. This port provides access from a remote management console to the Cisco SCE8000 via a LAN.

The procedures for cabling the GBE management port and testing connectivity between the Cisco SCE8000 and the remote management host are explained in the following sections.

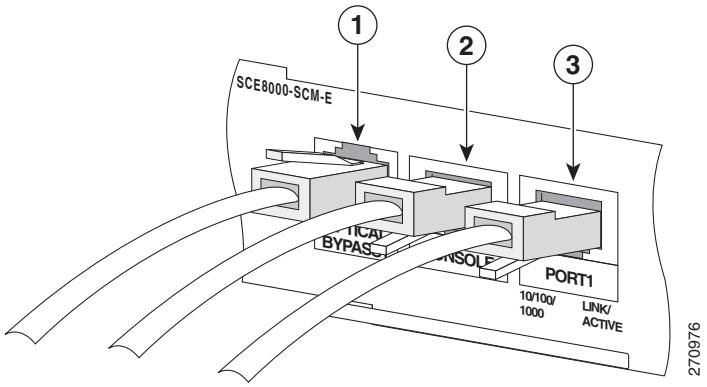
- How to Cable the Management Port, page 5-4
- How to Verify Management Interface Connectivity, page 5-5

How to Cable the Management Port

The SCE8000-SCM-E has one GBE port that is used as the management port, located in slot# 1 of the Cisco SCE8000 chassis, and labeled Port1.

Step 1 Plug the Ethernet cable provided (with attached RJ-45 connector) into Port 1on the front panel of the SCE8000-SCM-E. (See item #3 in Figure 5-2 below.)

Figure 5-2 Cabling the Management Port



Step 2 Connect the other end of the Ethernet cable into your management network.

Make sure that you push on the RJ-45 connector attached to the cable until you hear a click, which indicates that the connector is fully inserted and secured in the receptacle. Gently pull on the plug to confirm whether the plug is locked into the socket.

If the Link LED on the port does not light, try removing the cable and reinserting it firmly into the module socket. To disconnect the plug from the socket, press down on the raised portion on top of the plug, releasing the latch. You should hear an audible click indicating the latch has released. Carefully pull the plug out of the socket.

If the Link LED still does not light, verify that the cable is connected correctly to the appropriate network element on its second end.

How to Verify Management Interface Connectivity

If the Cisco SCE8000 platform has been powered up, test now to verify that connectivity has been established between the Cisco SCE8000 and the remote management host. If the Cisco SCE8000 platform is not powered up, perform this step after starting the Cisco SCE8000 platform.

Step 1 After you connect the cable to the GBE management port and to your network, check the relevant Mng port LEDS.

There are two GBE LEDs — Link/Active, and 10/100/1000 (refer to Service Control Module (SCE8000-SCM-E), page 2-2).

At this point, check that the Link/Active LED is green.

The state of the 10/100/1000 LED will depend on the Ethernet network settings, as follows:

- Off: 10 Mbps
- Green: 100 Mbps
- Orange: 1000 Mbps

Step 2 Test connectivity. From the host that you intend to use for remote management, ping to the Cisco SCE8000 by typing **ping** and the Cisco SCE8000 IP address, and pressing **Enter** (see the example, below).

Note Note that only this step (Step 2), is performed from the remote management host (connected by LAN to the Mng port).

This verifies that an active connection exists between the specified station and the management port.

The **ping** command sends an echo request packet to an IP address and then awaits a reply. Ping output can help you evaluate path-to-host reliability, delays over the path, and whether the host can be reached or is functioning.

EXAMPLE:

The following example displays a typical ping response where the target IP address is 10.10.10.20.

```
C:\>ping 10.10.10.20
pinging 10.10.10.20 ...
PING 10.10.10.20: 56 data bytes
64 bytes from host (10.10.10.20): icmp_seq=0. time=0. ms
64 bytes from host (10.10.10.20): icmp_seq=1. time=0. ms
64 bytes from host (10.10.10.20): icmp_seq=2. time=0. ms
64 bytes from host (10.10.10.20): icmp_seq=3. time=0. ms
----10.10.10.20 PING Statistics----
4 packets transmitted, 4 packets received, 0% packet loss
round-trip (ms) min/avg/max = 0/0/0
```

CHAPTER 6

Cabling the Line Ports and Completing the Installation

This chapter provides instructions for cabling the Cisco SCE8000 10 Gigabit Ethernet ports for single, cascaded, and MGSCP topologies. In a cascade topology, this includes the cascade ports as well as the line ports.

The 10 Gigabit Ethernet ports are located on the 10G SPA modules, which are installed in the SCE8000-SIP module in slot #3 of the Cisco SCE8000 chassis.

Note When installing a cascaded system, it is extremely important to follow the sequence of procedures outlined in the section Cascaded Systems, page 6-15.

Note When installing an External Optical Bypass module, the Cisco SCE8000 line ports are connected to the module. See Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-11 for complete instructions.

Connecting the Line Ports to the Network

Single Link: Inline Topology

In the inline topology, the Cisco SCE8000 resides physically on the 10 GBE (Ten Gigabit Ethernet) link between the subscribers and the network. The subscribers are usually connected through either a BRAS (in DSL access), a PDSN (in wireless access), a CMTS (in the Cable access), or a switch or router aggregator (in other topologies). The network is a router or layer 3 switch network element connecting the Cisco SCE8000 towards the core of the network.

Guidelines for single link inline topologies

- If only two SPA modules are installed (only two SPA modules are required for a single link), they must be installed in bays 0 and 1 of the SPA jacket card.
- Inline topologies require both Receive and Transmit fibers.
- To maintain link continuity at all times, an optical bypass module should be installed.

Single link inline connectivity

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side

Single Link: Receive-only Topology

In this topology, an optical splitter unit resides physically on the 10 GBE link that the Cisco SCE8000 should monitor. The optical splitter unit is connected to the Cisco SCE8000 Rx links only. For each link monitored, there will be two Rx connections to the Cisco SCE8000, one for each direction of traffic flow in the link. The traffic passes through the optical splitter, which allows the Cisco SCE8000 to monitor traffic without affecting the normal optic and data path between subscriber and network.

Note Receive-only topologies can also be implemented using a switch. Such a switch must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

Guidelines for single link receive-only topologies:

- If only two SPA modules are installed (only two SPA modules are required for a single link), they must be installed in bays 0 and 1 of the SPA jacket card.
- Receive-only topologies use only Receive fibers.

Single link receive-only connectivity

- Port 3/0/0: Link 0, Split of optic signal transmitted by subscribers side
- Port 3/1/0: Link 0, Split of optic signal transmitted by network side

Dual Link: Single Cisco SCE8000 Topologies

In this topology, one Cisco SCE8000 is connected to two full duplex, 10GBE links. The Cisco SCE8000 may be either inline, to support both monitoring and traffic control functionality, or receive-only for traffic monitoring functionality only.

Guidelines for dual link topologies:

- SPA modules 0 and 1 are connected to the first link (Link 0)
- SPA modules 2 and 3 are connected to the second link (Link 1)

- Dual link inline topologies require both Receive and Transmit fibers.
- Dual link receive-only topologies use only Receive fibers.
- To maintain link continuity at all times on both links when using the inline topology, two optical bypass modules should be installed.

Dual link connectivity

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side
- Port 3/2/0: Link 1, Subscribers side
- Port 3/3/0: Link 1, Network side

Note Receive-only topologies can be implemented using either an optical splitter or a switch. If a switch is used, it must support SPAN functionality that includes separation between ingress and egress traffic and multiple SPAN-ports destinations.

Dual Link: Two Cisco SCE8000s Topology

In this topology, two Cisco SCE8000s are connected to two full duplex, 10GBE links, providing full redundancy through cascading the two Cisco SCE8000s. The Cisco SCE8000s must be inline.

Note When installing a cascaded system, it is extremely important to follow the sequence of procedures outlined in Cascaded Systems, page 6-15.

When two Cisco SCE8000s are used, the ports 3/0/0 and 3/1/0 in each Cisco SCE8000 are connected to the links, while ports 3/2/0 and 3/3/0 are the cascade ports that are used for communicating between the two Cisco SCE8000s as follows:

Cisco SCE8000 #1

- Port 3/0/0: Link 0, Subscribers side
- Port 3/1/0: Link 0, Network side
- Port 3/2/0: Cascade, connect to Port 3/3/0 in Cisco SCE8000 #2
- Port 3/3/0: Cascade, connect to Port 3/2/0 in Cisco SCE8000 #2

Cisco SCE8000 #2

- Port 3/0/0: Link 1, Subscribers side
- Port 3/1/0: Link 1, Network side
- Port 3/2/0: Cascade, connect to Port 3/3/0 in Cisco SCE8000 #1
- Port 3/3/0: Cascade, connect to Port 3/2/0 in Cisco SCE8000 #1

Inline topologies require connecting both Receive and Transmit fibers to the Cisco SCE8000. Cascade ports always require both Receive and Transmit fibers to be connected.

To maintain link continuity at all times, two optical bypass modules should be installed and the traffic ports should be connected to these bypass modules.

Multi-Gigabit Service Control Platforms (MGSCP) Topologies

In this topology, multiple Cisco SCE 8000 platforms are connected to a Cisco 7600 Series router used as a load-balancer ("dispatcher") between the platforms. Traffic enters the router, is distributed between the Cisco SCE8000 platforms by the router EtherChannel, and returns to the router to be forwarded to its original destination.

General guidelines for MGSCP topologies:

- Since there are two links per Cisco SCE8000 platform, the minimum number of platforms required is half the number of links used.
- Each link corresponds to one port on the EtherChannel (EC) on the Cisco 7600 Series router. Each EC supports a maximum of eight active ports. Therefore, if all eight EC ports are configured, four Cisco SCE8000 platforms are required.
- For N+1 redundancy, two additional ports (connected to the standby platform) must be configured as standby ports on both ECs.

  Therefore, for N+1 redundancy, one router and five Cisco SCE8000 platforms would be used to support eight links.
- If two Cisco 7600 Series routers are used (for network redundancy), one link on each Cisco SCE8000 platform is connected to each router. This requires twice the number of Cisco SCE8000 platforms, one platform for each link.
  - A minimum of eight Cisco SCE8000 platforms are required to support eight ports.
  - For N+1 redundancy, nine Cisco SCE8000 platforms would be used to support eight active links

When cabling to the EC, follow these guidelines:

- The Cisco SCE platform ports MUST be connected to the EC ports in the same order on both sides.
- The EC ports should be sorted in an ascending order by their physical interface numbers.
- In a topology with two Cisco 7600 Series routers, the order of connection to the EC ports must be the same on both routers. In order for both routers to send the traffic of a given subscriber to the same SCE platform, the SCE platforms must be connected to both routers in exactly the same order (one SCE platform connected to the first link on both routers, another SCE platform connected to the second link on both routers, and so on).
- Refer to MGSCP Connectivity Examples, page 6-4 for specific examples explaining how to connect the Cisco SCE8000 ports to the EC ports in various topologies.
- Refer to Dual Link: Single Cisco SCE8000 Topologies, page 6-2 and Single Link: Inline Topology, page 6-2 for further information on specific cabling schemes.

MGSCP Connectivity Examples

The First Step-Ordering the EC Ports

This section explains how to order the EC ports and assign them to links. This example is the basis for all following examples.

1. Sort the EC ports in an ascending order by their physical interface numbers. Take the following EC interfaces as an example:
   - EC1 (subscriber side): 0/1, 0/2, 1/3, 1/5
   - EC2 (network side): 2/2, 3/1, 3/2, 3/4
2. Order the ports in subscriber/network pairs according to their order in the ECs (the first port in EC1 (subscriber side) is paired with the first port in EC2 (network side) and so on):
   - Link 1. S=0/1, N=2/2
   - Link 2. S=0/2, N=3/1
   - Link 3. S=1/3, N=3/2
   - Link 4. S=1/5, N=3/4

Single Router MGSCP Connectivity

Four links would require two Cisco SCE8000 platforms. Connect the ordered pairs, each pair of EC ports to a pair of Subscriber/Network ports in a Cisco SCE8000 platform:

- Cisco SCE8000 #1: Links 1 and 2
- Cisco SCE8000 #2: Links 3 and 4

The actual connections might look like this:

- S=0/1, Cisco SCE8000 #1 3/0/0
- N=2/2, Cisco SCE8000 #1 3/1/0
- S=0/2, Cisco SCE8000 #1 3/2/0
- N=3/1, Cisco SCE8000 #1 3/3/0
- S=1/3, Cisco SCE8000 #2 3/0/0
- N=3/2, Cisco SCE8000 #2 3/1/0
- S=1/5, Cisco SCE8000 #2 3/2/0
- N=3/4, Cisco SCE8000 #2 3/3/0

Single Router with N+1 Redundancy MGSCP Connectivity

In order to have N+1 redundancy, we must add one extra SCE platform as the standby platform. We also must add two more ports on each EC to be used as standby ports. In this case, we would use three SCE platforms, two on the traffic links and one for redundancy, which would be connected to the standby ports.

If we added ports 0/3 and 2/3 on EC1 and 2/4 and 4/4 on EC2, the ECs would look like this:

- EC1: 0/1, 0/2, 0/3, 1/3, 1/5, 2/3
- EC2: 2/2, 2/4, 3/1, 3/2, 3/4, 4/4

The standby ports must be the two highest-numbered ports:

- EC1 standby ports: 1/5, 2/3
- EC2 standby ports: 3/4, 4/4

The traffic ports would be assigned to the links as follows:

- Link 1. S=0/1, N=2/2
- Link 2. S=0/2, N=2/4
- Link 3. S=0/3, N=3/1
- Link 4. S=1/3, N=3/2

The standby ports would be assigned to the links as follows:

- Link 5 (standby). S=1/5, N=3/4
- Link 6 (standby). S= 2/3, N=4/4

If Cisco SCE8000 #3 is the redundant platform, Links 5 &6 would be connected to it and the actual connections might look like this:

- S=0/1, Cisco SCE8000 #1 3/0/0
- N=2/2, Cisco SCE8000 #1 3/1/0
- S=0/2, Cisco SCE8000 #1 3/2/0
- N=2/4, Cisco SCE8000 #1 3/3/0
- S=0/3, Cisco SCE8000 #2 3/0/0
- N=3/1, Cisco SCE8000 #2 3/1/0
- S=1/3, Cisco SCE8000 #2 3/2/0
- N=3/2, Cisco SCE8000 #2 3/3/0
- S=1/5, Cisco SCE8000 #3 3/0/0
- N=3/4, Cisco SCE8000 #3 3/1/0
- S=2/3, Cisco SCE8000 #3 3/2/0
- N=4/4, Cisco SCE8000 #3 3/3/0

Dual Routers MGSCP Connectivity

Four links on each router would require four Cisco SCE8000 platforms. For the sake of simplicity, we assume that the EC ports are the same on both routers.

Connect the ordered pairs, each pair of EC ports to a pair of Subscriber/Network ports in a Cisco SCE8000 platform:

- Cisco SCE8000 #1: Link 1 on both routers
- Cisco SCE8000 #2: Link 2 on both routers
- Cisco SCE8000 #3: Link 3 on both routers
- Cisco SCE8000 #4: Link 4 on both routers

The actual connections might look like this:

- Router 1: S=0/1, Cisco SCE8000 #1 3/0/0
- Router 2: S=0/1, Cisco SCE8000 #1 3/2/0
- Router 1: N=2/2, Cisco SCE8000 #1 3/1/0
- Router 2: N=2/2, Cisco SCE8000 #1 3/3/0
- Router 1: S=0/2, Cisco SCE8000 #2 3/0/0
- Router 2: S=0/2, Cisco SCE8000 #2 3/2/0
- Router 1: N=3/1, Cisco SCE8000 #2 3/1/0

- Router 2: N=3/1, Cisco SCE8000 #2 3/3/0
- Router 1: S=1/3, Cisco SCE8000 #3 3/0/0
- Router 2: S=1/3, Cisco SCE8000 #3 3/2/0
- Router 1: N=3/2, Cisco SCE8000 #3 3/1/0
- Router 2: N=3/2, Cisco SCE8000 #3 3/3/0
- Router 1: S=1/5, Cisco SCE8000 #4 3/0/0
- Router 1: S=1/5, Cisco SCE8000 #4 3/2/0
- Router 1: N=3/4, Cisco SCE8000 #4 3/1/0
- Router 1: N=3/4, Cisco SCE8000 #4 3/3/0

Dual Routers with N+1 Redundancy MGSCP Connectivity

In order to have N+1 redundancy, we must add one extra SCE platform as the standby platform. We also must add another port on each EC to be used as standby ports. In this case, we would use five SCE platforms, four on the traffic links and one for redundancy, which would be connected to the standby ports.

Again, for the sake of simplicity, we assume that the EC ports are the same on both routers.

If we added ports 0/3 on EC1 and 2/4 on EC2, the ECs would look like this:

- EC1: 0/1, 0/2, 0/3, 1/3, 1/5
- EC2: 2/2, 2/4, 3/1, 3/2, 3/4

The standby ports must be the highest-numbered ports:

- EC1 standby port: 1/5
- EC2 standby port: 3/4

The traffic ports would be assigned to the links as follows:

- Link 1. S=0/1, N=2/2
- Link 2. S=0/2, N=2/4
- Link 3. S=0/3, N=3/1
- Link 4. S=1/3, N=3/2

The standby ports would be assigned to the links as follows:

- Link 5 (standby). S=1/5, N=3/4

If Cisco SCE8000 #5 is the redundant platform, Link 5 from both routers would be connected to it and the actual connections might look like this:

- Router 1: S=0/1, Cisco SCE8000 #1 3/0/0
- Router 2: S=0/1, Cisco SCE8000 #1 3/2/0
- Router 1: N=2/2, Cisco SCE8000 #1 3/1/0
- Router 2: N=2/2, Cisco SCE8000 #1 3/3/0
- Router 1: S=0/2, Cisco SCE8000 #2 3/0/0
- Router 2: S=0/2, Cisco SCE8000 #2 3/2/0
- Router 1: N=2/4, Cisco SCE8000 #2 3/1/0
- Router 2: N=2/4, Cisco SCE8000 #2 3/3/0

- Router 1: S=0/3, Cisco SCE8000 #3 3/0/0
- Router 2: S=0/3, Cisco SCE8000 #3 3/2/0
- Router 1: N=3/1, Cisco SCE8000 #3 3/1/0
- Router 2: N=3/1, Cisco SCE8000 #3 3/3/0
- Router 1: S=1/3, Cisco SCE8000 #4 3/0/0
- Router 2: S=1/3, Cisco SCE8000 #4 3/2/0
- Router 1: N=3/2, Cisco SCE8000 #4 3/1/0
- Router 2: N=3/2, Cisco SCE8000 #4 3/3/0
- Router 1: S=1/5, Cisco SCE8000 #5 3/0/0
- Router 2: S=1/5, Cisco SCE8000 #5 3/2/0
- Router 1: N=3/4, Cisco SCE8000 #5 3/1/0
- Router 2: N=3/4, Cisco SCE8000 #5 3/3/0

The Optical Bypass Module

The external optical bypass module is an optional component that provides additional protection by enabling automatic preservation of the network 10GBE link. For more information regarding the external bypass module, refer to The Cisco SCE8000 Optical Bypass, page 2-8.

There are two installation options for the optical bypass module:

- Chassis mount—The optical bypass module may be installed in the panel in slot #4 of the Cisco SCE8000 chassis. This panel hosts up to two optical bypass modules.
- External mounting panel: —The optical bypass module may be installed in a panel that is mounted in a 19" rack. This panel can host up to four optical bypass modules.

Note Make sure to use the correct type of optical bypass module (single-mode or multi-mode) according to the transceivers and cabling that are used for the subscriber and network links.

Note Since the optic bypass module will directly connect the subscriber and network side optic paths when bypassing the SCE8000, the subscriber and network optic links must be of the same type (single-mode or multi-mode) and wavelength.

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Avoid exposure to radiation and do not stare into open aperture.**

Optical Bypass Module Connectivity

Single Link Topology

A single link requires only one bypass module.

- Subscriber side network element <->Port A on the bypass module
- Cisco SCE8000 port 3/0/0 <->Port C on the bypass module
- Network side network element <->Port B on the bypass module
- Cisco SCE8000 port 3/1/0 <->Port D on the bypass module
- CTRL <->left-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.

Dual Link Topology

A dual link requires two bypass modules.

- Subscriber side network element <->Port A on bypass module #1
- Cisco SCE8000 port 3/0/0 <->Port C on bypass module #1
- Network side network element <->Port B on bypass module #1
- Cisco SCE8000 port 3/1/0 <->Port D on bypass module #1
- CTRL on bypass module #1 <->left-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.
- Subscriber side network element <->Port A on bypass module #2
- Cisco SCE8000 port 3/2/0 <->Port C on bypass module #2
- Network side network element <->Port B on bypass module #2
- Cisco SCE8000 port 3/3/0 <->Port D on bypass module #2
- CTRL on bypass module #2 <->right-hand 'Optical Bypass' port on Cisco SCE8000-SCM-E module.

Cabling the 10GBE Line Interface Ports

Note When installing an External Optical Bypass module, the Cisco SCE8000 line ports are connected to the module. See Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-11 for complete instructions.

Warning **Class 1 laser. Avoid exposure to radiation and do not stare into open aperture.**

Fiber Specifications

The following table presents the fiber specifications. The Cisco SCE8000 may be ordered with either multi-mode or single mode transceivers. The transceiver type is indicated on the front panel under the ports. Note that all transceivers on any individual Cisco SCE8000 are the same mode, either 850nm multi-mode OR 1310nm single mode.

Table 6-1 Fiber Specifications

SCE Model	Transceiver	Transmit Power	Receive Power	Typical (Max.) Distance
Cisco SCE8000 10GBE MM	850nm multi-mode	–9.5 to –4 dBm	–17 to 0 dBm	• 750m for 50µm Core Diameter MMF • 400m for 62.5µm Core Diameter MMF
Cisco SCE8000 10GBE SM	1310nm FRP laser single mode	–9.5 to –3 dBm	–20 to 3 dBm	10 km for 9.0µm Core Diameter SMF

Optical Device Maintenance

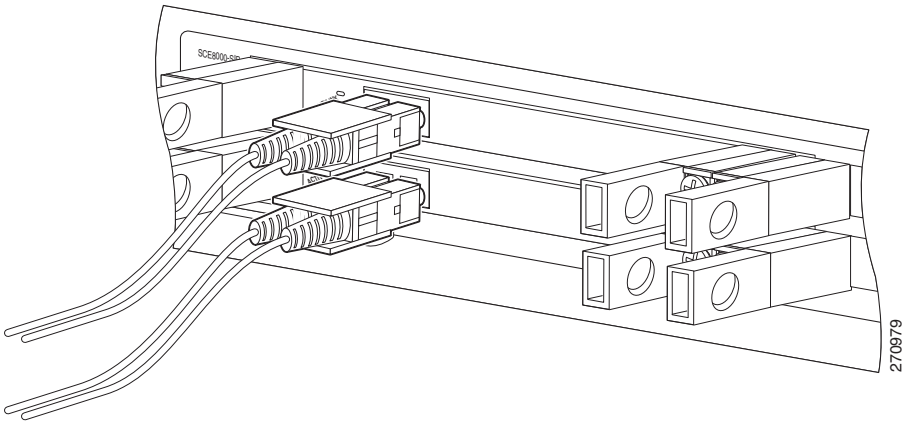
Any contamination of the fiber connection can cause failure of the component or failure of the whole system. A particle that partially or completely blocks the core generates strong back reflections, which can cause instability in the laser system. Inspection, cleaning, and reinspection are critical steps to take before making fiber-optic connections.

How to Cable the 10GBE Line Interface Ports

Step 1 Take the appropriate fiber optic cable (see Fiber Specifications, page 6-10) and plug it into the appropriate port on the 10GBE interface on the SPA module in slot #3 of the Cisco SCE8000. (See Figure 6-1 below.)

Make sure to push on the connector until you hear a click, which indicates that the connector is fully inserted and secured in the receptacle. Always make sure that you insert the connector completely into the socket.

Figure 6-1 Cabling the 10GBE Interface



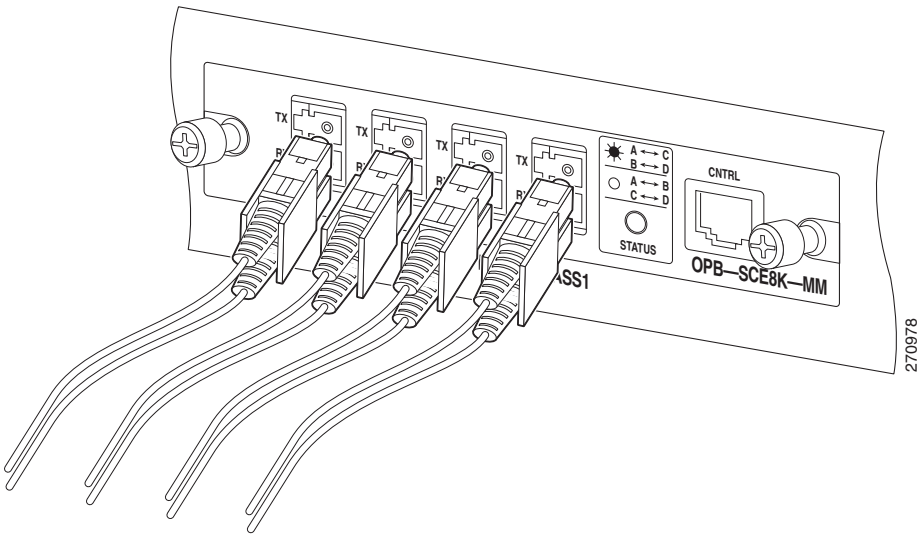
Step 2 Verify that the link LED is green.

If the link LED does not light, try removing the network cable plug and reinserting it firmly into the module socket.

Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module

Refer to Optical Bypass Module Connectivity, page 6-8 for specific connectivity.

Figure 6-2 External Optical Bypass Module Line Interfaces



Step 1 Take the appropriate fiber optic cable (see Fiber Specifications, page 6-10) and plug it into the appropriate port (A or B) on the external bypass module.

Step 2 Using a cable with LC connectors on both ends, plug one end into the appropriate port (C or D) on the external bypass module and the other end into the appropriate 10GBE interface in slot #3 of the SCE8000 chassis.

Step 3 Using the control cable provided, which has RJ11 connectors on both ends, plug one end into the CNTRL interface on the external bypass module (see Figure 6-3) and plug the other end into the External Bypass interface on the SCE8000-SCM-E in slot #1 of the SCE8000 chassis (see item #1 in Figure 6-4 below). If using only one external bypass module, use External Bypass port #1. If using two external bypass modules, use both External Bypass ports on the SCE8000-SCM-E in slot #1.

Step 4 Complete the installation and powering up of the SCE8000.

By its nature, the optic bypass module will not connect the link to the SCE8000-SIP module until the entire SCE8000 system is fully functional. It is necessary to bring the SCE8000 to fully operational, non-bypassed status, in order to confirm correct functioning of the link through the optic bypass module to the SCE8000-SIP module.

Step 5 Verify link connectivity by checking that the link LED on the 10GBE interface is green, or by using the SCE8000 command line.

Figure 6-3 Cabling the CNTLR Interface on the External Bypass Module

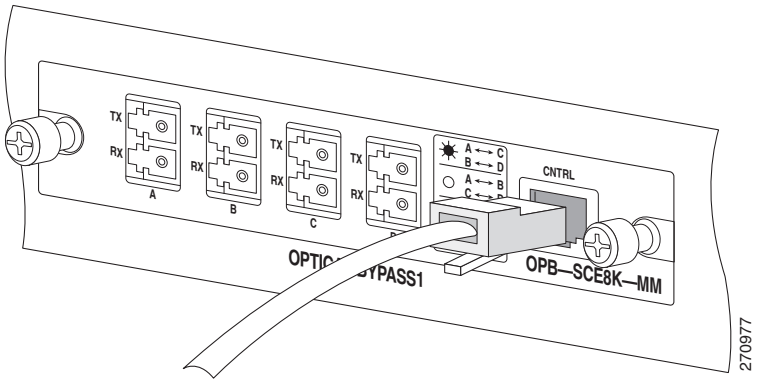
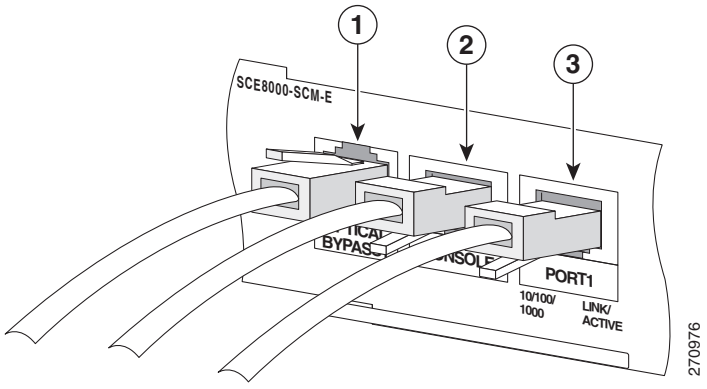


Figure 6-4 Cabling the SCE8000-SCM-E Module



Testing Connectivity: Examining Link LEDs and Counters

If the Cisco SCE8000 platform has been powered up, test now to verify that connectivity has been established on all links. If the Cisco SCE8000 platform is not powered up, perform this step after starting the Cisco SCE8000 platform.

Examining the LEDs

The 10GBE Link LED should be green, verifying that an active connection exists.

How to View the Ten Gigabit Ethernet Port Status

Step 1 At the Cisco SCE8000# prompt, type **show interface TenGigabitEthernet 3/** ***baynumber*** **/0**.

This displays the port link status.

The following example displays a system response.

```
Cisco SCE8000#show interface TenGigabitEthernet 3/1/0
Actual Status:
Link is on
Bandwidth: 10000000Kbps
Burst-size: 500000bytes
```

How to View the Ten Gigabit Ethernet Counters

In an inline topology, you can monitor traffic via the platform counters for both the Rx and Tx connections. The counters increase as packets flow through the Cisco SCE8000 for both Rx and Tx.

However, in receive-only topologies, the counters for the Tx do not increment, as the SCE8000 is only monitoring traffic, and not re-transmitting it

Step 1 At the Cisco SCE8000# prompt, type **show interface TenGigabitEthernet 3/** ***baynumber*** **/0 counters**.

This displays the TenGigabitEthernet counters. This command enables you to verify that traffic is taking place. You can see that the counters increase, together with real-time packet flow through the Cisco SCE8000.

Remember, in bump-in-the-wire topology, both the Rx and Tx counters apply as traffic monitors. For receive-only topologies, using an external splitter, only the Rx counters apply.

The following example shows the counters of the first Ten Gigabit Ethernet interface.

```
Cisco SCE8000#show interface TenGigabitEthernet 3/0/0 counters
In total octets: 100
In good unicast packets: 90
```

```
In good multicast packets: 0
In good broadcast packets: 10
In packets discarded: 0
In packets with CRC/Alignment error: 0
In undersized packets: 0
In oversized packets: 0
Out total octets: 93*2^32+1022342538
Out unicast packets: 858086051
Out non unicast packets: 0
Out packets discarded: 0
```

How to View the User Log Counters

You should view the user log for errors that occurred during the installation process.

Step 1 At the SCE8000# prompt, type **show logger device User-File-Log counters** and press **Enter**.

```
SCE8000#show logger device user-file-log counters
Logger device User-File-Log counters:
Total info messages: 1
Total warning messages: 0
Total error messages: 0
Total fatal messages: 0
```

If there are “Total error messages” or “Total fatal messages”, use the **show logger device User-File-Log** command to display details about the errors.

How to Load and Activate a Service Control Application

The Cisco SCE8000 platform provides the basic functionalities of Service Control analysis and enforcement. A Service Control solution requires that a Service Control application be loaded into the platform, to take advantage of the unique SCE platform capabilities.

Loading and activating an application includes the following stages:

- Downloading the application provided as an SLI file to the Cisco SCE8000 disk.
- Activating the application.
- Configuring the application.

The detailed procedure of how to perform these operations is not specified and described in this manual. For further details, refer to the following documentation:

- *Cisco Service Control Application for Broadband User Guide*
- *Cisco Service Control Application for Broadband Reference Guide*

Cascaded Systems

How to Install a Cascaded System

This section outlines the installation procedures for a redundant solution with two cascaded Cisco SCE8000 platforms. Refer to the *Cisco Service Control Engine (SCE) CLI Command Reference* for details of the CLI commands.

When working with two Cisco SCE8000 platforms with split-flow and redundancy, it is extremely important to follow this installation procedure.

Step 1 Install both Cisco SCE8000 platforms, power them up, and perform the initial system configuration. (See Chapter 4, "Installing the Cisco SCE8000 Chassis"and Chapter 5, "Connecting the Management Interfaces"and Starting the Cisco SCE8000 Platform, page 7-1.)

To maintain link continuity at all times, including during the reload sequence and power failure events, optical bypass modules must be installed.

Step 2 Connect both Cisco SCE8000 platforms to the management station. (See Connecting the Management Interface, page 5-4.)

Step 3 Connect the cascade ports. (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

The cascade ports must be either be connected directly in Layer 1 (dark fibers), or using the following procedure to connect through a switch.

- Connect port 3/2/0 from box A and port 3/3/0 from box B to a single switch. Configure them both on the same access VLAN, which will be used only by the interfaces connected to these ports. No other interfaces in the switch should reside on that VLAN.
- Connect port 3/3/0 from box A and port 3/2/0 of box B to a switch on a different VLAN. Again, the access ports should be configured as access ports on this VLAN, which will be used only by the interfaces connected to these ports. No other interfaces in the switch reside on the VLAN.

Step 4 Set topology configurations for each Cisco SCE8000 platform via the connection-mode options. (See How to Configure the Connection Mode, page 6-16.)

Step 5 Make sure that the Cisco SCE8000 platforms have synchronized and active Cisco SCE8000 platform was selected.

Use the **show interface linecard 0 connection-mode** command.

Step 6 If you want to start with bypass, change the link mode to your required mode in both Cisco SCE8000 platforms on both links. The bypass mode will be applied only to the active Cisco SCE8000 platform. (See How to Set the Link Mode, page 6-17.)

Step 7 Make sure that the link mode is as you required. (See Monitoring the System, page 6-18.)

Use the **show interface linecard 0 link mode** command.

Step 8 Connect the traffic port of Cisco SCE8000 platform #1. This will cause a momentary down time until the network elements from both sides of the Cisco SCE8000 platform auto-negotiate with it and start working (when working inline). (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

Step 9 Connect the traffic port of Cisco SCE8000 platform #2. This will cause a momentary down time until the network elements from both sides of the Cisco SCE8000 platform auto-negotiate with it and start working (when working inline). (See Dual Link: Two Cisco SCE8000s Topology, page 6-3.)

Step 10 When full control is needed, change the link mode on both Cisco SCE8000 platforms on both links to 'forwarding'. It is recommended to first configure the active Cisco SCE8000 platform and then the standby. (See How to Set the Link Mode, page 6-17.)

Step 11 You can now start working with the Subscriber Manager.

CLI Commands for Cascaded Systems

This section presents CLI commands relevant to the configuration and monitoring of a redundant system.

Use the following commands to configure and monitor a redundant system:

- `connection-mode`
- `[no] force failure-condition`
- `show interface linecard 0 connection-mode`
- `show interface linecard 0 physically-connected links`
- Topology-Related Parameters for Redundant Topologies, page 6-16
- How to Configure the Connection Mode, page 6-16
- How to Set the Link Mode, page 6-17
- Monitoring the System, page 6-18

Topology-Related Parameters for Redundant Topologies

All four of the topology-related parameters are required when configuring a redundant topology.

- **Connection mode** — Redundancy is achieved by cascading two SCE platforms. Therefore the connection mode for both SCE platforms is:
  - Inline-cascade
- **Physically-connected-links** — For each of the cascaded SCE platforms, this parameter defines the number of the link (Link 0 or Link 1) connected to this SCE platform.
- **Priority** — For each of the cascaded SCE platforms, this parameter defines whether it is the primary or secondary device.
- **On-failure** — For each of the cascaded SCE platforms, this parameter determines whether the system cuts the traffic or bypasses it via an external optical bypass module when the SCE platform either has failed or is booting.

  If either the *bypass* or *external-bypass* option is configured, the optical bypass module must be properly installed. If an optical bypass device is not detected, the command is executed but a warning is issued. The system then enters warning mode until either the command is changed, or the presence of an optical bypass device is detected

How to Configure the Connection Mode

Use the following command to configure the connection mode, including the following parameters:

- inline
- physically connected links
- behavior upon failure of the SCE platform
- primary/secondary

Step 1 From the Cisco SCE8000(config if)# prompt, type **connection-mode** ***inline-cascade*** **physically-connected-links** ***(link-0\|link-1)*** **priority** ***(primary\|secondary)*** **on-failure** ***(external-bypass\|bypass\|cutoff)*** and press **Enter**.

EXAMPLE 1

Use the following command to configure the primary SCE platform in a two-SCE platform inline topology. Link 1 is connected to this SCE platform and the behavior of the SCE platform if a failure occurs is bypass.

```
Cisco SCE8000(config if)# connection-mode inline-cascade physically-connected-links link-1
priority primary on-failure bypass
```

EXAMPLE 2

Use the following command to configure the SCE platform that might be cascaded with the SCE platform in Example 1. This SCE platform would have to be the secondary SCE platform, and Link 0 would be connected to this SCE platform, since Link 1 was connected to the primary. The connection mode would be the same as the first, and the behavior of the SCE platform if a failure occurs is also bypass.

```
Cisco SCE8000(config if)# connection-mode inline-cascade physically-connected-links link-0
priority secondary on-failure bypass
```

How to Set the Link Mode

The SCE platform has an internal hardware card used to maintain the links even when the SCE platform fails. This hardware card has three possible modes of operation:

- bypass
- forwarding
- cutoff

Normally, the link mode is selected by the SCE platform software according to the configured connection-mode. However, the **link mode** command can be used to enforce a specific desired mode. This may be useful when debugging the network, or in cases where we would like the SCE platform just to forward the traffic. (Note that this is only relevant to inline topologies even though the configuration is available also when in receive-only mode.)

The following link mode options are available:

- **Forwarding** — forwards traffic on the specified link to the SCE platform for processing.
- **Bypass** — stops all forwarding of traffic on the specified link to the SCE platform. Traffic still flows on the link, but is not processed in any way by the SCE platform.

  This does not affect the redundancy states.
- **Cutoff** — completely cuts off flow of traffic through the specified link.

Note the following recommendations and restrictions:

- Link mode is relevant only to inline topologies.
- It is recommended that in cascaded topologies, both SCE platforms be configured for the same link mode, otherwise the service will be unpredictable.
- The default link mode is forwarding. When other link modes are selected, active service control is not available and any service control configuration will not be applicable.

Step 1 From the Cisco SCE8000 (config if)# prompt, type **link mode [forwarding|bypass|cutoff]** and press **Enter**.

Monitoring the System

Use the following commands to view the current connection mode and link mode parameters.

- How to View the Current Connection Mode, page 6-18
- How to View the Current Link Mode, page 6-18
- How to View the Current Link Mappings, page 6-18

How to View the Current Connection Mode

Step 1 From the Cisco SCE8000# prompt, type **show interface linecard 0 connection-mode** and press **Enter**.

How to View the Current Link Mode

Step 1 From the Cisco SCE8000# prompt, type **show interface linecard 0 link mode** and press **Enter**.

How to View the Current Link Mappings

Step 1 From the Cisco SCE8000# prompt, type **show interface linecard 0 physically-connected-links** and press **Enter**.

CHAPTER 7

Basic Cisco SCE8000 Platform Operations

This chapter describes how to start up the Cisco SCE8000 platform, reboot, and shutdown. It also describes how to manage configurations.

Starting the Cisco SCE8000 Platform

The procedures for starting the Cisco SCE8000 platform are explained in the following sections:

Checking Conditions Prior to System Startup

Check the following conditions before you start your Cisco SCE8000 platform:

- Both power supply units are installed and connected. (If only one power supply is connected it will put the box in warning state.)
- First-time startup at installation:
  - Cisco SCE8000 platform connected to local console (CON port)
  - The console terminal is turned on and properly configured
- Subsequent startups
  - Line interfaces are properly cabled (optional)
  - Cisco SCE8000 platform is connected to at least one of the following types of management stations:

- Direct connection to local console (CON port)
- Remote management station via the LAN (Mng port)

Performing Complex Configurations

After you have installed your Cisco SCE8000 platform hardware, checked all external connections, turned on the system power, allowed the system to boot up, and performed the initial system configuration, you might need to perform more complex configurations, which are beyond the scope of this publication.

For further information on system and interface configuration, refer to the following documents:

- *Cisco SCE8000 Software Configuration Guide*
- *Cisco SCE8000 CLI Command Reference*

Starting the System and Observing Initial Conditions

After installing your Cisco SCE8000 platform and connecting cables, complete the following steps to start the Cisco SCE8000 platform:

Step 1 Make sure the power cables are connected to the Cisco SCE8000 platform.

Step 2 Plug the AC power supply cables into the AC power source, or make sure the circuit breakers at the DC panels are turned to the on position. Turn on the switches on both power supplies.

Step 3 Listen for the fans; you should immediately hear them operating.

Step 4 During the boot process, observe the following LEDs on the SCE8000-SCM-E:

- The Power LEDs should be green.
- Optical Bypass LED should be green while the Cisco SCE8000 is in bypass and unlit when the optical bypass is turned off.
- The Status LED should be a constant amber while booting. After a successful boot, the Status LED is steady green.

Note It takes a several minutes for the Cisco SCE8000 to boot and for the status LED to change from amber to green.

What to Do Next

If the system does not complete each of the steps in the startup procedure, proceed to Identifying Startup Problems, page 8-6 for troubleshooting recommendations and procedures.

Final Tests

The procedures for performing the final tests to verify that the Cisco SCE8000 is functioning properly are explained in the following sections:

Verifying Operational Status

After all the ports are connected, verify that the Cisco SCE8000 is not in a Warning state.

Step 1 On the front panel of the Service Control module, examine the Status LED; it should be green.

Step 2 To display the operation status of the system, at the Cisco SCE8000# prompt, type **show system operation-status** and press **Enter**.

A message displaying the operation status of the system appears. If the system is operating in order, the following message appears:

```
System Operation status is Operational.
```

If the Status LED is red or flashing amber, the following message appears:

```
System Operation status is Warning
Description:
1. Power Supply problem
2. Line feed problem
3. Amount of External bypass devices detected is lower than expected amount
```

Viewing the User Log Counters

View the user log for errors that occurred during the installation process.

Step 1 At the SCE# prompt, type **show logger device user-file-log counters** and press **Enter**.

Examples for Viewing the User Log Counters

The following example shows the current User-File-Log device counters.

```
SCE#show logger device user-file-log counters
Logger device User-File-Log counters:
Total info messages: 1
Total warning messages: 0
Total error messages: 0
Total fatal messages: 0
```

If there are “Total error messages” or “Total fatal messages”, use the **show logger device user-file-log** command to display details about the errors.

Viewing the Ten Gigabit Ethernet Port Status

Step 1 At the Cisco SCE8000# prompt, type **show interface TenGigabitEthernet 3/** ***baynumber*** **/0**.

This displays the port link status.

The following example displays a system response.

```
Cisco SCE8000#show interface TenGigabitEthernet 3/1/0
Actual Status:
Link is on
Bandwidth: 10000000Kbps
Burst-size: 500000bytes
```

Viewing the Ten Gigabit Ethernet Counters

In an inline topology, you can monitor traffic via the platform counters for both the Rx and Tx connections. The counters increase as packets flow through the Cisco SCE8000 for both Rx and Tx.

However, in receive-only topologies, the counters for the Tx do not increment, as the SCE8000 is only monitoring traffic, and not re-transmitting it

Step 1 At the Cisco SCE8000# prompt, type **show interface TenGigabitEthernet 3/** ***baynumber*** **/0 counters**.

This displays the TenGigabitEthernet counters. This command enables you to verify that there is traffic on the line. You can see that the counters increase, together with real-time packet flow through the Cisco SCE8000.

Remember, in bump-in-the-wire topology, both the Rx and Tx counters apply as traffic monitors. For receive-only topologies, using an external splitter, only the Rx counters apply.

The following example shows the counters of the first Ten Gigabit Ethernet interface.

```
Cisco SCE8000#show interface TenGigabitEthernet 3/0/0 counters
In total octets: 100
In good unicast packets: 90
In good multicast packets: 0
In good broadcast packets: 10
In packets discarded: 0
In packets with CRC/Alignment error: 0
In undersized packets: 0
In oversized packets: 0
Out total octets: 93*2^32+1022342538
Out unicast packets: 858086051
Out non unicast packets: 0
Out packets discarded: 0
```

Managing Cisco SCE8000 Configurations

After you have installed your SCE8000 platform hardware, checked all external connections, turned on the system power, and allowed the system to boot up, you are ready to install the Service Control application. However, before you install the application, you might need to configure the SCE platform. Instructions for configuring the SCE8000 platform are beyond the scope of this publication.

For further information on system and interface configuration, refer to the following documents:

- *Cisco SCE8000 Software Configuration Guide*
- *Cisco SCE8000 CLI Command Reference*

The procedures for managing Cisco SCE8000 configurations are explained in the following sections:

- Viewing Configurations, page 7-5
- Saving or Changing the Configuration Settings, page 7-6
- Restoring a Previous Configuration, page 7-8

Viewing Configurations

When you enter configuration commands, it immediately affects the SCE platform operation and configuration. This configuration, referred to as the running-config, is saved in the SCE platform volatile memory and is effective while the SCE platform is up. After reboot, the SCE platform loads the startup-config, which includes the non-default configuration that was saved by the user, into the running-config.

The SCE platform provides commands for:

- Viewing the running configuration with only user-configured (non-default) values: **show running-config**
- Viewing the running configuration with all the SCE platform running configuration values, whether default or not: **show running-config all-data**
- Viewing the startup configuration: **show startup-config**

After configuring the SCE platform, you may query for the running configuration using the command **show running-config**.

Step 1 At the Cisco SCE8000# prompt, type show running-config.

The system shows the running configuration.

```
SCE8000#>show running-config
#This is a general configuration file (running-config).
#Created on 12:06:13  UTC  SUN  May  11  2008
#cli-type 1
#version 1
no management-agent notifications notification-list
1417,1418,804,815,1404,1405,1406,1407,1408,400
no management-agent notifications notification-list
402,421,440,441,444,445,446,450,437,457
no management-agent notifications notification-list 3593,3594,3595,10040
snmp-server community "public" ro
RDR-formatter forwarding-mode multicast
RDR-formatter destination 10.56.96.26 port 33000 category number 1 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 2 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 3 priority 100
```

```
RDR-formatter destination 10.56.96.26 port 33000 category number 4 priority 100
interface LineCard 0
connection-mode inline on-failure external-bypass
no silent
no shutdown
attack-filter subscriber-notification ports 80
replace spare-memory code bytes 3145728
interface GigabitEthernet 1/1
ip address 10.56.96.46 255.255.252.0
interface TenGigabitEthernet 3/0/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/1/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/2/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/3/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"

exit
ip default-gateway 10.56.96.1
line vty 0 4
exit
management-agent property "com.pcube.management.framework.install.activation.operation"
"Install"
management-agent property "com.pcube.management.framework.install.activated.package" "SCA
BB"
management-agent property "com.pcube.management.framework.install.activated.version"
"3.1.6 build 79"
management-agent property "com.pcube.management.framework.install.activation.date" "Sun
May 11 08:44:04 GMT+00:00 2008"
flow-filter partition name "ignore_filter" first-rule 4 num-rules 32
flow-filter partition name "udpPortsToOpenBySw" first-rule 40 num-rules 21
```

Saving or Changing the Configuration Settings

When you make changes to the current running configuration and you want those changes to continue to be in effect when the system restarts, you must save the changes before leaving the management session. You do that by saving the running configuration to the startup configuration file.

The SCE platform provides multiple interfaces for the purpose of configuration and management. All interfaces supply an API to the same database of the SCE platform and any configuration made through one interface is reflected through all interfaces. Furthermore, when saving the running configuration to the startup configuration from any management interface, all configuration settings are saved regardless of the management interface used to set the configuration.

For backup purposes, the old startup-config file is saved under the directory: `/system/prevconf`. Refer to Restoring a Previous Configuration, page 7-8 for an explanation on how to restore a previous configuration.

To remove a configuration command from the running-config, use the **no** form of the command.

Step 1 At the SCE# prompt, type **show running-config** to view the running configuration.

The running configuration is displayed.

Step 2 Check the displayed configuration to make sure that it is set the way you want. If not, make the changes you want before saving.

Step 3 Type **copy running-config startup-config**.

The system saves all running configuration information to the configuration file, which is used when the system reboots.

The configuration file holds all information that is different from the system default in a file called *config.tx1* located in the directory: */system*.

Example for Saving or Changing the Configuration Settings

The following example shows how to save the running configuration file (first displaying the file to review the settings).

```
SCE#show running-config
#This is a general configuration file (running-config).
#Created on 12:06:13  UTC  SUN  May  11  2008
#cli-type 1
#version 1
no management-agent notifications notification-list
1417,1418,804,815,1404,1405,1406,1407,1408,400
no management-agent notifications notification-list
402,421,440,441,444,445,446,450,437,457
no management-agent notifications notification-list 3593,3594,3595,10040
snmp-server community "public" ro
RDR-formatter forwarding-mode multicast
RDR-formatter destination 10.56.96.26 port 33000 category number 1 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 2 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 3 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 4 priority 100
interface LineCard 0
connection-mode inline on-failure external-bypass
no silent
no shutdown
attack-filter subscriber-notification ports 80
replace spare-memory code bytes 3145728
interface GigabitEthernet 1/1
ip address 10.56.96.46 255.255.252.0
interface TenGigabitEthernet 3/0/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/1/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/2/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/3/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"

exit
ip default-gateway 10.56.96.1
line vty 0 4
exit
management-agent property "com.pcube.management.framework.install.activation.operation"
"Install"
management-agent property "com.pcube.management.framework.install.activated.package" "SCA
BB"
```

```
management-agent property "com.pcube.management.framework.install.activated.version"
"3.1.6 build 79"
management-agent property "com.pcube.management.framework.install.activation.date" "Sun
May 11 08:44:04 GMT+00:00 2008"
flow-filter partition name "ignore_filter" first-rule 4 num-rules 32
flow-filter partition name "udpPortsToOpenBySw" first-rule 40 num-rules 21
SCE#copy running-config startup-config
Writing general configuration file to temporary location...
Backing-up general configuration file...
Copy temporary file to final location...
SCE#
```

Tip To remove a configuration command from the running-config, use the **no** form of the command.

The following example illustrates how to remove all DNS settings from the running configuration.

```
SCE(config)#no ip name-server
```

Restoring a Previous Configuration

When you save a new configuration, the system automatically backs up the old configuration in the directory `/system/prevconf/`. Up to nine versions of the startup configuration file are saved, namely `config.tx1-config.tx9`, where `config.tx1` is the most recently saved file.

You can view the old startup configuration files using the CLI command **more**.

Restoring a previous startup configuration means renaming the file so it overwrites the startup configuration (`config.txt`) file.

Step 1 At the SCE# prompt, type **more /system/prevconf/config.tx1** to view the configuration file.

The system displays the configuration information stored in the file.

Step 2 Read the configuration information to make sure it is the configuration you want to restore.

Note that you cannot undo the configuration restore command.

Step 3 Type **copy /system/config.tx1 /system/config.txt**.

The system sets the startup configuration to the configuration from *config.tx1*.

Example for Restoring a Previous Configuration

The following example displays a saved configuration file and then restores the file to overwrite the current configuration.

```
SCE#more /system/prevconf/config.tx1
#This is a general configuration file (running-config).
#Created on 12:07:41  UTC  SUN  May  11  2008
#cli-type 1
#version 1
no management-agent notifications notification-list
1417,1418,804,815,1404,1405,1406,1407,1408,400
no management-agent notifications notification-list
402,421,440,441,444,445,446,450,437,457
no management-agent notifications notification-list 3593,3594,3595,10040
snmp-server community "public" ro
```

```
RDR-formatter forwarding-mode multicast
RDR-formatter destination 10.56.96.26 port 33000 category number 1 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 2 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 3 priority 100
RDR-formatter destination 10.56.96.26 port 33000 category number 4 priority 100
interface LineCard 0
connection-mode inline on-failure external-bypass
no silent
no shutdown
attack-filter subscriber-notification ports 80
replace spare-memory code bytes 3145728
interface GigabitEthernet 1/1
ip address 10.56.96.46 255.255.252.0
interface TenGigabitEthernet 3/0/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/1/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/2/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"
interface TenGigabitEthernet 3/3/0
bandwidth 10000000 burst-size 50000
global-controller 0 name "Default Global Controller"

exit
ip default-gateway 10.56.96.1
line vty 0 4
exit
management-agent property "com.pcube.management.framework.install.activation.operation"
"Install"
management-agent property "com.pcube.management.framework.install.activated.package" "SCA
BB"
management-agent property "com.pcube.management.framework.install.activated.version"
"3.1.6 build 79"
management-agent property "com.pcube.management.framework.install.activation.date" "Sun
May 11 08:44:04 GMT+00:00 2008"
flow-filter partition name "ignore_filter" first-rule 4 num-rules 32
flow-filter partition name "udpPortsToOpenBySw" first-rule 40 num-rules 21
SCE#copy /system/config.tx1 /system/config.txt
```

How to Display the SCE Platform Version Information

Use this command to display global static information on the SCE platform, such as software and hardware version, image build time, system uptime, last open packages names and information on the SLI application assigned.

Step 1 From the SCE> prompt, type **show version** and press **Enter**.

Example for Displaying the SCE Platform Version Information

The following example shows how to display the SCE platform version information.

```
SCE>show version
System version: Version 3.1.6S Build 279
Build time: Jun 10 2008, 19:27:47 (Change-list 335658)
Software version is: Version 3.1.6S Build 279
Hardware information is:
----------------
Firmware
----------------
kernel : [kernel] 1.0.0/5 (inactive: [kernel] 1.0.0/5)
u-boot : [uboot] 1.0.0/6 (field: [uboot] 0.8.1/13)
select : [ubs-cf1] 1.0.0/5 (secondary: [ubs-cf1] 1.0.0/5)
----------------
Slot 1: SCM-8000
----------------
serial-num : CAT1202G07D
part-num : 73-10598-01 38
cpld : 0x8162
vtpld : 0xc001
summit-0 : 0x10008
summit-1 : 0x10008
dpt/tx : 0x4837
cls/ff : 0x2047
cls flow cap: 33554432

----------------
TVR
----------------
#cpus : 1
cpu SVR : 0x80900120
cpu PVR : 0x80040202
cpu freq : 1000MHz
cpu (eeprom): 2.1, 1000MHz
cpld : 0xa1b7
cpld-ufm : 0xa803
summit : 0x10007
cf : Model=SMART CF, FwRev=0x20060811, Size=4062240KB
----------------
CFC-0
----------------
board type : P2
#cpus : 3
cpu-0 SVR : 0x80900121
cpu-0 PVR : 0x80040202
cpu-0 freq : 1500MHz
cpu-1 SVR : 0x80900121
cpu-1 PVR : 0x80040202
cpu-1 freq : 1500MHz
cpu-2 SVR : 0x80900121
cpu-2 PVR : 0x80040202
cpu-2 freq : 1500MHz
cpu (eeprom): 2.1, 1500MHz
cpld-0 : 0xb20e
cpld-1 : 0xb20e
cpld-2 : 0xb20e
cpld-0-ufm : 0xb803
cpld-1-ufm : 0xb803
cpld-2-ufm : 0xb803
summit-0 : 0x1000a
summit-1 : 0x1000a
fc : 0x1044
----------------
CFC-1
----------------
board type : P2
```

```
#cpus : 3
cpu-0 SVR : 0x80900121
cpu-0 PVR : 0x80040202
cpu-0 freq : 1500MHz
cpu-1 SVR : 0x80900121
cpu-1 PVR : 0x80040202
cpu-1 freq : 1500MHz
cpu-2 SVR : 0x80900121
cpu-2 PVR : 0x80040202
cpu-2 freq : 1500MHz
cpu (eeprom): 2.1, 1500MHz
cpld-0 : 0xb20e
cpld-1 : 0xb20e
cpld-2 : 0xb20e
cpld-0-ufm : 0xb803
cpld-1-ufm : 0xb803
cpld-2-ufm : 0xb803
summit-0 : 0x1000a
summit-1 : 0x1000a
fc : 0x1044
----------------
Slot 3: SIP-8000
----------------
serial-num : CAT1204G01H
part-num : 73-10947-01
cpld : 0x9162
summit-0 : 0x10006
summit-1 : 0x10006
dpt-0 : 0x3033
dpt-1 : 0x3033
spa[0] : SPA-1X10GE-L-V2
spa[1] : SPA-1XTENGE-XFP
spa[2] : SPA-1X10GE-L-V2
spa[3] : SPA-1XTENGE-XFP
----------------
SCE8000 Chassis
----------------
product-num : CISCO7604
serial-num : FOX10420BKZ
part-num : 73-9789-02
part-rev : A0
vid : V01
Part number: 73-10598-01 38
Revision:
Software revision:
LineCard S/N : CAT1202G07D
Power Supply type: AC
SML Application information is:
No application is configured.
Logger status: Enabled

Platform: SCE8000 - 4x10GBE
Management agent interface version: SCE Agent 3.1.6 Build 134
Software package file: ftp://ftpserver/simba.pkg
SCE8000 uptime is 9 minutes, 54 seconds
```

How to Display the SCE Platform Inventory

Unique Device Identification (UDI) is a Cisco baseline feature that is supported by all Cisco platforms. This feature allows network administrators to remotely manage the assets in their network by tracing specific devices through either CLI or SNMP. The user can display inventory information for a remote device via either:

- Entity MIB (see *ENTITY-MIB* in the *Cisco Service Control Engine (SCE) Software Configuration Guide*)
- CLI **show inventory** command

  This command displays the UDIs only for field replaceable units (FRU).
- CLI **show inventory raw** command.

  This command displays all UDIs on the Cisco SCE8000 platform.

The **show inventory** CLI commands display the following information:

- *Device name*
- *Description*
- *Product identifier*
- *Version identifier*
- *Serial number*

Step 1 From the SCE> prompt, type **show inventory [raw]** and press **Enter**.

Examples for Displaying the SCE Platform Inventory

Displaying the SCE Platform Inventory: FRUs Only

The following example shows how to display the inventory (UDIs) for the FRUs only.

```
SCE>show inventory
NAME: "SCE8000 Chassis", DESCR: "CISCO7604"
PID: CISCO7604          , VID: V0 , SN: FOX105108X5
NAME: "SCE8000 Service Control Module (SCM) in slot 1", DESCR: "SCE8000-SCM-E"
PID: SCE8000-SCM-E      , VID: V0 , SN: CAT1122584N
NAME: "SCE8000 SPA Interface Processor (SIP) in slot 3", DESCR: "SCE8000-SIP"
PID: SCE8000-SIP        , VID: V0 , SN: CAT1150G07F

NAME: "SPA-1X10GE-L-V2", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2    , VID: V02, SN: JAE11517RMR

NAME: "SPA-1X10GE-L-V2", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2    , VID: V02, SN: JAE11496E1P

NAME: "SPA-1X10GE-L-V2", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2    , VID: V02, SN: JAE11517RIO
```

```
NAME: "SPA-1X10GE-L-V2", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2   , VID: V02, SN: JAE115295HH

NAME: "SCE8000 FAN 1", DESCR: "FAN-MOD-4HS"
PID: FAN-MOD-4HS       , VID: V0 , SN: DCH11013744

NAME: "SCE8000 AC or DC power supply 0", DESCR: "PWR-2700-AC/4"
PID: PWR-2700-AC/4     , VID: V0 , SN: APQ105000MV

NAME: "SCE8000 AC or DC power supply 1", DESCR: "PWR-2700-AC/4"
PID: PWR-2700-AC/4     , VID: V0 , SN: APQ105000MV

NAME: "XFP-10GLR-OC192SR ", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1142N4B7

NAME: "XFP-10GLR-OC192SR ", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1142N4AL

NAME: "XFP-10GLR-OC192SR ", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1141N43R

NAME: "XFP-10GLR-OC192SR ", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1143N4JN
```

Displaying the Complete SCE Platform Inventory

The following example shows how to display the complete inventory (UDIs) of the SCE platform.

```
SCE>show inventory raw
"SCE8000 Chassis", DESCR: "CISCO7604"
PID: CISCO7604         , VID: V01, SN: FOX105108X5


NAME: "SCE8000 Physical Slot 1", DESCR: "Container SCE8000 Service Control Module (SCM)
slot"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Physical Slot 2", DESCR: "Container SCE8000 Service Control Module (SCM)
slot"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Physical Slot 3", DESCR: "Container SCE8000 SPA Interface Processor (SIP)
slot"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Physical Slot 4", DESCR: "Container SCE8000 Optical Bypass slot"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Fan Module", DESCR: "Container SCE8000 Fan Module"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 AC and DC power supply", DESCR: "Container SCE8000 AC and DC power supply"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Link", DESCR: "Container SCE8000 Link"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Backplane", DESCR: "Container SCE8000 Backplane "
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Service Control Module (SCM) in slot 1", DESCR: "SCE8000-SCM-E"
PID: SCE8000-SCM-E     , VID: V01, SN: CAT1122584N
```

```
NAME: "SCE8000 SPA Interface Processor (SIP) in slot 3", DESCR: "SCE8000-SIP"
PID: SCE8000-SIP       , VID: V01, SN: CAT1150G07F

NAME: "SCE8000 Link 0", DESCR: "SCE8000 Link"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 Link 1", DESCR: "SCE8000 Link"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 SIP bay 3/0", DESCR: "SCE8000 SIP bay"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 SIP bay 3/1", DESCR: "SCE8000 SIP bay"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 SIP bay 3/2", DESCR: "SCE8000 SIP bay"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 SIP bay 3/3", DESCR: "SCE8000 SIP bay"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 SPA module 3/0", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2   , VID: V02, SN: JAE11517RMR

NAME: "SCE8000 SPA module 3/1", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2   , VID: V02, SN: JAE11496E1P

NAME: "SCE8000 SPA module 3/2", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2   , VID: V02, SN: JAE11517RIO

NAME: "SCE8000 SPA module 3/3", DESCR: "SPA-1X10GE-L-V2"
PID: SPA-1X10GE-L-V2   , VID: V02, SN: JAE115295HH

NAME: "TenGigabitEthernet3/0/0", DESCR: "SCE8000 SPA port"
PID: ""                , VID: "" , SN: ""

NAME: "TenGigabitEthernet3/1/0", DESCR: "SCE8000 SPA port"
PID: ""                , VID: "" , SN: ""

NAME: "TenGigabitEthernet3/2/0", DESCR: "SCE8000 SPA port"
PID: ""                , VID: "" , SN: ""


NAME: "TenGigabitEthernet3/3/0", DESCR: "SCE8000 SPA port"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 FAN 1", DESCR: "FAN-MOD-4HS"
PID: FAN-MOD-4HS       , VID: V01, SN: DCH11013744

NAME: "SCE8000 AC power supply 0", DESCR: "PWR-2700-AC/4"
PID: PWR-2700-AC/4     , VID: V02, SN: APQ105000MV

NAME: "SCE8000 DC power supply 1", DESCR: "PWR-2700-DC/4"
PID: PWR-2700-DC/4     , VID: V03, SN: APQ1049000S

NAME: "SCE8000 optic 3/0/0", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1142N4B7

NAME: "SCE8000 optic 3/1/0", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1142N4AL

NAME: "SCE8000 optic 3/2/0", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1141N43R
```

```
NAME: "SCE8000 optic 3/3/0", DESCR: "XFP-10GLR-OC192SR "
PID: XFP-10GLR-OC192SR , VID: V02, SN: AGA1143N4JN

NAME: "SCE8000 traffic processor 1", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 2", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 3", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 4", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 5", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 6", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 7", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 8", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 9", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 10", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 11", DESCR: "SCE8000 traffic processor"
PID: ""                , VID: "" , SN: ""

NAME: "SCE8000 traffic processor 12", DESCR: "SCE8000 traffic processor"
```

How to Display the System Uptime

Use this command to see how long the system has been running since the last reboot.

Step 1 At the SCE> prompt, type **show system-uptime** and press **Enter**.

Example for Displaying the System Uptime

The following example shows how to display the system uptime of the SCE platform.

```
SCE#show system-uptime
Cisco SCE8000 uptime is 21 minutes, 37 seconds
```

Rebooting and Shutting Down the SCE Platform

Rebooting the SCE Platform

Rebooting the SCE platform is required after installing a new package, in order for that package to take effect. There might be other occasions where rebooting the SCE platform is necessary.

Note When the SCE restarts, it loads the startup configuration, so all changes made in the running configuration will be lost. You are advised to save the running configuration before performing reload, as described in Saving or Changing the Configuration Settings, page 7-6.

Step 1 At the SCE# prompt, type **reload** and press **Enter**.

A confirmation message appears.

Step 2 Type **y** to confirm the reboot request and press **Enter**.

Examples for Rebooting the SCE Platform

The following example shows the commands for system reboot.

```
SCE# reload
Are you sure? y
the system is about to reboot, this will end your CLI session
```

How to Shut Down the SCE Platform

Shutting down the SCE platform is required before turning the power off. This helps to ensure that non-volatile memory devices in the SCE platform are properly flushed in an orderly manner.

Note When the SCE platform restarts, it loads the startup configuration, so all changes made in the running configuration will be lost. You are advised to save the running configuration before performing reload, as described in Saving or Changing the Configuration Settings, page 7-6.

Step 1 Connect to the serial console port (The CON connector on the front panel of the Service Control module in slot #1, 9600 baud).

The SCE# prompt appears.

Step 2 Type **reload shutdown**.

A confirmation message appears.

Step 3 Type **y to** confirm the shutdown request and press **Enter**.

Examples for Shutting Down the SCE Platform

The following example shows the commands for system shutdown.

```
SCE#reload shutdown
You are about to shut down the system.
The only way to resume system operation after this
is to cycle the power off, and then back on.
Continue?
y
IT IS NOW SAFE TO TURN THE POWER OFF.
```

Note Since the SCE platform can recover from the power-down state only by being physically turned off (or cycling the power), this command can only be executed from the serial CLI console. This limitation helps prevent situations in which a user issues this command from a Telnet session, and then realizes he or she has no physical access to the SCE platform.

CHAPTER 8

Troubleshooting

Your Cisco SCE8000 platform went through extensive testing before leaving the factory. However, if you encounter problems starting it, use the information in this chapter to help isolate the cause of the problems. The procedures in this chapter assume that you are troubleshooting the initial system startup, and that your Cisco SCE8000 platform is in the original factory configuration. If you have removed or replaced components or changed any default settings, the recommendations in this chapter might not apply. Make sure to review the safety warnings listed in the *Regulatory Compliance and Safety Information for the Cisco SCE8000* document that accompanied your Cisco SCE8000 platform before using the troubleshooting procedures in this chapter.

Troubleshooting Overview

This section describes the troubleshooting methods used in this chapter and describes how the Cisco SCE8000 platform is divided into subsystems for more efficient problem solving. If you are unable to easily solve the problem, contact a customer service representative for assistance and further instructions. Provide the representative with the following information:

- Date you received the Cisco SCE8000
- Chassis serial number
- Type of software and release number
- Brief description of the problem you are having
- Brief explanation of the steps you have taken to isolate and resolve the problem
- Maintenance agreement or warranty information

The following table shows the general troubleshooting strategy described in this chapter. Refer to this table, as necessary, to follow the steps to isolate problems to a specific subsystem and resolve the problem if possible

Table 8-1 Troubleshooting Strategy for Startup Problems

	Action	Yes	No
Step 1	Turn power on. Go to Step 2		
Step 2	Check the following: • Front panel power LED on? • Power supply 'Input OK' LEDs on? • 'Output fail' LEDs not on?	Go to Step 3	Refer to Troubleshooting the Power Subsystem, page 8-7 and go to Step 3.
Step 3	Status LED red (failure)	Refer to Troubleshooting the Firmware Package Installation, page 8-8 and go to Step 4.	Go to Step 4
Step 4	Management interface operational?	Go to Step 5	Refer to Troubleshooting the Management Subsystem, page 8-8 and go to Step 5.
Step 5	Link interfaces operational?	Go to Step 6	Refer to Troubleshooting the Link Interface Subsystem, page 8-10 and go to Step 6.
Step 6	System startup successful (all interfaces operating normally).	-	-

Information About Troubleshooting Tools

There are two tools that will help you to successfully troubleshoot your Cisco SCE8000 installation:

- CLI Commands for Troubleshooting, page 8-2
- Checking the LEDs, page 8-4

CLI Commands for Troubleshooting

Use the following commands to provide information to help you troubleshoot installation of your Cisco SCE8000 platform. Refer to *Cisco SCE8000 Software Configuration Guide* or the *Cisco SCE8000 CLI Command Reference* for more information.

Note Remember that if the management interface is not operational, you should connect the Cisco SCE8000 platform to a local console so that you can enter CLI commands for troubleshooting.

- **Troubleshooting firmware package installation:**
  - **boot system <filename>**— Specifies and verifies the package file to be installed. Error messages or other output identify problems with the package file.

  Following is a sample output from the **boot system** command.

```
SCE(config)#boot system ftp://cisco:cisco@10.10.10.10/downloads/SENum.pkg.pkg
Verifying package file SENum.pkg.pkg…
Package file verified OK.
```

- **Troubleshooting the management subsystem:**
  - **show interface GigabitEthernet 1/1** — Displays IP address and auto-negotiation information for the management interfaces.

  Following is a sample output from the **show interface GigabitEthernet 1/1** command.

```
ip address: 10.1.6.145
subnet mask: 255.255.0.0
Configured speed: auto, configured duplex: auto
AutoNegotiation is On, link is Up, actual speed: 100, actual duplex: half
```

  - **show ip default-gateway** — Displays the IP address of the configured default gateway.

  Following is a sample output from the **show ip default-gateway** command.

```
Default gateway: 10.1.1.1
```

  - **show ip route** — Displays the entire routing table and the destination of last resort (default-gateway).

  Following is a sample output from the **show ip route** command.

```
gateway of last resort is        10.1.1.1
```

  - **show access-lists** — Shows all access-lists or a specific access list.

  Following is a sample output from the **show access-lists** command.

```
Standard IP access list 1
Permit 10.1.1.0, wildcard bits 0.0.0.255
deny   any
```

  - **show telnet** — Displays the status of the telnet server daemon (**status**) or any active Telnet sessions (**sessions**).

  Following is a sample output from the **show telnet** command.

```
show telnet sessions
There is 1 active telnet session:
Index | Source
================
0     | 10.1.1.201
show telnet status
Telnet deamon is enabled.
```

  - **show line vty timeout** — Shows the timeout configured for Telnet sessions.

  Following is a sample output from the **show line vty timeout** command.

```
Timeout is 30 minutes
```

- **Troubleshooting the link interface subsystem:**
  - **show interface TenGigabitEthernet 3/#/0** — Displays information for a specific 10GBE Interface.

  Following is a sample output from the **show interface** command.

```
Auto negotiation configured: Disabled
Actual status:
Link is: ON
Auto negotiation: Disabled
Bandwidth (L1): 10000000 Kbps, Burst-size: 500000 bytes
Pseudo IP Address: Not Configured
```

  - **show interface TenGigabitEthernet 3/#/0 counters** — Displays the values of counters of a GBE interface.

  Following is a sample output from the **show interface counters** command.

```
L2 In total octets: 792000
In good unicast packets: 12000
In good multicast packets: 0
In good broadcast packets: 0
In packets discarded: 0
In packets with CRC/Alignment error: 0
In undersized packets: 0
In oversized packets: 0
Rx pause packets: 0
L2 Out total octets: 0
Out unicast packets: 0
Out good multicast packets: 0
Out good broadcast packets: 0
Out packets discarded: 0
Tx pause packets: 0
Tx regular collision events: 0
L2 Bandwidth Kbps (Rx + Tx): 0
# of packets received of length (in octets):
64: 0, 65-127: 12000, 128-255: 0,
256-511: 0, 512-1023: 0, 1024-1518: 0,
1519+: 0
```

Refer to Troubleshooting with the User Log, page 8-11 for an explanation of commands related to the user log.

Checking the LEDs

The LEDS on the SCE8000-SMC-E front panel, along with the LEDs on the power supplies and fan assembly are the most immediate problem-detection mechanism of the platform. Refer to the following sections for information on Cisco SCE8000 platform LEDS:

- Table 2-3 on page 2-3
- Examining the LEDs, page 6-13
- Starting the System and Observing Initial Conditions, page 7-2
- Cisco SCE8000 Operational Status, page 8-5

Cisco SCE8000 Operational Status

The following table lists the operational states of the Cisco SCE8000. The Status LED on the Service Control module reflects the current Cisco SCE8000 operational status. Once boot is complete, the operational status can be displayed using CLI command **show system operation-status** .

Table 8-2 Cisco SCE8000 Operational States

Cisco SCE8000 Operational Status	Description	Status LED State
Booting	Initial state after reset	Amber
Operational	Cisco SCE8000 becomes operational after completing the following process: • Boot is completed • Power-on self-tests are completed without failure • Platform configuration is applied	Steady green
Warning	Cisco SCE8000 is fully operational (as above) but one of the following occurred: • GBE Management port link is down • Internal temperature above threshold • Internal voltage not in expected range • Fan problem • Power supply problem • Insufficient space on the disk **Note** If the condition that caused the Cisco SCE8000 to be in Warning state is resolved (for example, link is up) the Cisco SCE8000 reverts to Operational state.	Flashing amber
Failure	System is in Failure state after Boot due to one of the following conditions: • Power-on test failure • Three abnormal reboots in less than 30 minutes • Platform configured to enter Failure mode consequent to failure-induced reboot (this is configurable using CLI command) • Severe system health problem, such as extensive overheating or voltage out of correct operating range. **Note** Depending on the cause of failure, the management interface and the platform configuration may or may not be active/available.	Red

Table 8-3 Power Supply LEDs

LED Label	Color	State	Function
INPUT OK	Green	On	The input voltage is present and within the required range.
		Off	The input voltage is not present or not within the required range.
OUTPUT FAIL	Green	On	The output voltage is not within the required range.
		Off	The output voltage is in the required range.
FAN OK	Green	On	Power supply internal fan is operational.
		Off	Power supply internal fan is not operational.
Power (front panel)	Green	Steady	Installed power supplies are functioning normally.
	Amber	Steady	One of the power supply units is disconnected or malfunctioning.
		Off	No power.

Table 8-4 Fan Assembly LED

LED Label	Color	State	Function
FAN STATUS	Green	On	All fans are operational.
		Off	One or more of the individual fans are not operational.

Problem Solving Using a Subsystems Approach

Identifying Startup Problems

Startup problems are commonly due to the source power or to a poor cable connection.

When you start up the Cisco SCE8000 platform for the first time, you should observe the startup sequence described in Starting the Cisco SCE8000 Platform, page 7-1. This section contains a more detailed description of the normal startup sequence and describes the steps to take if the system does not perform that sequence as expected. LEDs indicate all system states in the startup sequence. By checking the state of the LEDs, you can determine when and where the system failed in the startup sequence. Use the following descriptions to isolate the problem to a subsystem, and then proceed to the appropriate sections to try to resolve the problem.

When you start up the system by turning on the power supply switch, the following should occur:

- You should immediately hear the fans operating.

- If the Status LED is flashing orange, indicating a warning state, check the user log:

  At the prompt, type: **more user log**

  If any of the following warning messages appear, and the root cause is not obvious and easily solved (such as obstruction of external air-flow) turn the Cisco SCE8000 platform off and call technical support.

  - "voltage problem:"
  - "fans problem"
  - "abnormal raise in interior temperature:"

Troubleshooting the Power Subsystem

Check the following to help isolate a problem in the power subsystem. In the normally configured Cisco SCE8000 platform with redundant power supply units, it is unlikely that the device will not start at all. However, at startup it should be verified that both power supply units are operational, and therefore the following steps should be followed if the Power LED on the front panel remains unlit when the Cisco SCE8000 platform is powered up.

Note If the system powers off due to an environmental shutdown, wait at least one minute before manually rebooting the system, or it will pause indefinitely.

Table 8-5 Troubleshooting the Power Subsystem

Symptom	Possible Cause	Possible Solution
Power LED on the front panel and LEDs on the power supply unit are not lit, or do not remain lit continuously.	Power cable not fully seated at system.	Turn the power switch to the off position and reseat the power cable in the system.
	Power cable not fully seated at source.	Turn the switch to the off position and reseat the power cable at the power source.
	Power source is faulty.	Turn the switch to the off position, connect the power cable to another power source, if available, and turn the switch back on.
	Faulty power cable.	Turn the switch to the off position, remove the cable and replace it.
	Faulty power supply.	If the system still fails to come up when the power supply is connected to a different power source with a new power cable, the power supply unit is probably faulty. Contact a service representative.

Troubleshooting the Firmware Package Installation

Check the following to help isolate a problem in the installation of the firmware package.

Problems related to the installation of the firmware package could be any of the following:

- File not found in the expected location
- Wrong file type.
- Device to which the file is to be extracted is full.

Table 8-6 Troubleshooting the Firmware Package Installation

Diagnostic Action		
Enter the CLI command: • **configure** • **boot system <filename>**		
Symptom	**Possible Cause**	**Possible Solution**
Returned error is: `Error-File <filename>does not exist`	The package file does not exist in the specified location.	Verify package file location and try again.
In the output of the command, the package file platform is not the correct installation file for the Cisco SCE8000.	Package file platform mismatch.	Verify that you have the package file appropriate to your platform type

Troubleshooting the Management Subsystem

Check the following to help isolate a problem in the management subsystem.

Problems in the management subsystem could be any of the following:

- Management link is down. (Mng LINK LED not lit--also Status is WARNING)
- Management link is up (Mng LINK LED lit) but does not answer ping
- Telnet connection cannot be established due to link problems (Mng LINK LED not lit)
- Management link is up (Mng LINK LED lit) but Telnet connection cannot be established
- Telnet connection established, but terminates automatically

Note When the management link is down and/or a Telnet connection cannot be established, you must open a CLI session on a local terminal connected to the CON port. This enables you to solve the problem and then reconnect through the management port

.

Table 8-7 Troubleshooting the Management Subsystem

Symptom	Diagnostic Action	Possible Cause	Possible Solution
Management link down: • Mng LINK LED not lit	• CLI command **show interface GigabitEthernet 1/1** • ping to management interface fails	RJ 45 connector is not connected to the platform or to the network.	Reconnect the cable to the GBE port and to network.
		Cable is broken.	Check / Replace the cable.
Management link up: • Mng LINK LED is lit • **ping** to management interface fails	CLI commands • **show ip route** • **show ip default-gateway**	One of the following configurations may be wrong: • IP address / subnet mask • IP default gateway	See Initial Setup Parameters, page 5-2 Refer to "**IP Configuration**" in the *Cisco SCE8000 Software Configuration Guide*.
	CLI command `show access-lists`	An ACL may be assigned that denies entry.	See Initial Setup Parameters, page 5-2 Refer to "**Access Control Lists**" in the *Cisco SCE8000 Software Configuration Guide*.
• Telnet connection cannot be established • Mng LINK LED is not lit (link is down)	• CLI command **show interface GigabitEthernet 1/1**	Management interface IP address or subnet mask is incorrect.	Check / reconfigure management port IP address and subnet mask
• Telnet connection cannot be established • Mng LINK LED is lit (link is up)	CLI command: **show telnet status**	Telnet server is disabled.	Enable Telnet server: **service telnetd**
	CLI command: **show telnet sessions**	Too many Telnet connections (up to five concurrent sessions are supported via Telnet).	Close one or more of the open Telnet sessions.
	CLI command: s **how ip default-gateway**	Default gateway is incorrect (when the host used as client is not in the same network as the SCE Platform).	Check / reconfigure default gateway. See Initial Setup Parameters, page 5-2 Refer to "**IP Configuration**" in the *Cisco SCE8000 Software Configuration Guide*.

Table 8-7 Troubleshooting the Management Subsystem

Symptom	Diagnostic Action	Possible Cause	Possible Solution
	CLI command: **show ip route <host-ip-address>**	Routing tables are incorrectly configured (when the host used as client is not in the same network as the SCE Platform, and there is more than one gateway on the SCE Platform network).	Check / reconfigure routing tables. See Initial Setup Parameters, page 5-2 Refer to "**IP Configuration**" in the *Cisco SCE8000 Software Configuration Guide*.
	CLI commands: • **show access-lists** • **show ip access-class**	Host is not a member of a valid access-list.	See Initial Setup Parameters, page 5-2 Refer to "**Access Control Lists** " in the *Cisco SCE8000 Software Configuration Guide*.
Telnet connection terminates automatically	CLI commands: • **show line** • **show line vty timeout**	Telnet connection may be timing out.	Reconfigure line timeout. **timeout <time in seconds>**

Troubleshooting the Link Interface Subsystem

Check the following to help isolate a problem in the link interface subsystem.

In general, the case where no traffic is coming out of the Cisco SCE8000 is often caused by link problems or the 10GBE interface configuration. Note that in some cases, the problem which seems as a transmit problem could be in the Rx (no traffic is being received by the Cisco SCE8000 or there is actually no traffic on the line, which could be a normal situation).

Note In CLI commands for TenGigabitEthernet interfaces, # stands for the number of the SPA module (SCE8000-SIP subslot). This can be 0 through 3.

Problems in the link interface subsystem could be any of the following:

- Link is down. (LINK LED not lit and system status is WARNING)
- Peer does not receive traffic from Cisco SCE8000 (LINK LED is lit and Tx LED is flashing)
- 10GBE link is up but not receiving from peer (LINK LED is lit, but Rx LED is not flashing)

Table 8-8 Troubleshooting the Link Interface Subsystem

Symptom	Diagnostic Action	Possible Cause	Possible Solution
• Link is down. (LINK LED not lit) • Output counters not incrementing.	CLI command: • **show interface TenGigabitEthernet 3/#/0 counters**	Connector is not connected to the platform or to the network.	Reconnect the fiber to the 10GBE port and to network.
		Fiber is broken or damaged.	Reconnect / replace the fiber to the 10GBE port.
		Connectivity using external optic bypass is incorrect or problematic.	Reconnect / replace the fiber between the 10GBE port and the optic bypass module.
	Temporarily disconnect optic bypass module and check operation. See Cabling the 10GBE Line Interface Ports, page 6-9	Problem with external optic bypass module.	Replace the optic bypass module.
• 10GBE link is up (LINK LED is continuous green) • No traffic received (10GBE interface Rx LED is not flashing)		No traffic is being transmitted to the Cisco SCE8000 from its peers.	Check traffic connection at peer.

Troubleshooting with the User Log

The user log is an ASCII file that can be viewed in any editor. It contains a record of system events, including startup, shutdown and errors. You can use the Logger to view the user log to determine whether or not the system is functioning properly, as well as for technical support purposes.

- The Logging System, page 8-11
- Generating a File for Technical Support, page 8-13

The Logging System

Events are logged to one of two log files. After a file reaches maximum capacity, the events logged in that file are then temporarily archived. New events are then automatically logged to the alternate log file. When the second log file reaches maximum capacity, the system then reverts to logging events to the first log file, thus overwriting the temporarily archived information stored in that file.

Basic operations include:

- Copying the User Log to an external source
- Viewing the User Log
- Clearing the User Log
- Viewing/clearing the User Log counters

How to Copy the User Log to an External Source

You can view the log file by copying it to an external source. This command copies both log files to any external host running a FTP server.

Step 1 From the SCE# prompt, type **logger get user-log file-name** *ftp://username:password@ipaddress/path* and press **Enter** .

How to Copy the User Log to an Internal Location

You can view the log file by copying it to disk. This command copies both log files to the local SCE platform disk.

Step 1 From the SCE# prompt, type **logger get user-log file-name** *target-filename* and press **Enter**.

How to View the User Log

Note This command is not recommended when the user log is large. Copy a large log to a file to view it (see How to Copy the User Log to an External Source, page 8-12)

Step 1 From the SCE# prompt, type **more user-log** and press **Enter**.

How to Clear the User Log

You can clear the contents of the user log at any time. The user log contains important information regarding the functioning of the system. It is recommended that a copy be made before the log is cleared.

Step 1 From the SCE# prompt, type **clear logger device user-file-log** and press **Enter**.

Step 2 The system asks `Are you sure?`

Step 3 Type **y** and press **Enter**.

How to View the User Log Counters

There are two types of log counters:

- User log counters — count the number of system events logged from the SCE platform last reboot.
- Non-volatile counters — are not cleared during boot time

Step 1 From the SCE# prompt, type **show logger device user-file-log counters** and press **Enter**.

How to View the Non-volatile Counter For the User-file-log Only

Step 1 From the SCE# prompt, type **show logger device user-file-log nv-counters** and press **Enter**.

Generating a File for Technical Support

In order for technical support to be most effective, the user should provide them with the information contained in the system logs. Use the **logger get support-file** command to generate a support file for the use of Cisco technical support staff.

Step 1 From the SCE# prompt, type **logger get support-file** *filename* and press **Enter**.

The support information file is created using the specified filename. This operation may take some time.

Step 2 To copy the support file to an external source, from the SCE# prompt, type **copy** *filename ftp://username:password@ipaddress/path* and press **Enter**.

CHAPTER 9

Removal and Replacement Procedures

This chapter describes how to perform removal and replacement procedures for Cisco SCE8000 platform field-replaceable units (FRUs).

Warning **Before you install, operate, or service the system, read the *Regulatory Compliance and Safety Information for the Cisco SCE8000*. This guide contains important safety information you should know before working with the system.**

Safety

Warning **Before working on a chassis or working near power supplies, unplug the power cord on AC units; disconnect the power at the circuit breaker on DC units.**

Warning **The plug-socket combination must be accessible at all times because it serves as the main disconnecting device.**

Warning **Class 1 laser product.**

Warning **Because invisible laser radiation may be emitted from the aperture of the port when no cable is connected, avoid exposure to laser radiation and do not stare into open apertures.**

Warning **This equipment must be grounded. Never defeat the ground conductor or operate the equipment in the absence of a suitably installed ground conductor. Contact the appropriate electrical inspection authority or an electrician if you are uncertain that suitable grounding is available.**

Warning **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.**

Preventing Electrostatic Discharge Damage

Electrostatic discharge (ESD) damage, which can occur when electronic cards or components are improperly handled, results in complete or intermittent failures. Port adapters and processing modules consist of printed circuit boards that are fixed in metal carriers. Electromagnetic interference (EMI) shielding and connectors are integral components of the carrier. Although the metal carrier helps to protect the board from ESD, use a preventive antistatic strap during handling.

Following are guidelines for preventing ESD damage:

- Always use an ESD wrist or ankle strap and ensure that it makes good skin contact.
- Connect the equipment end of the strap to an unfinished chassis surface.
- When installing a component, use any available ejector levers or captive installation screws to properly seat the bus connectors in the backplane or midplane. These devices prevent accidental removal, provide proper grounding for the system, and help to ensure that bus connectors are properly seated.
- When removing a component, use any available ejector levers or captive installation screws to release the bus connectors from the backplane or midplane.
- Handle carriers by available handles or edges only; avoid touching the printed circuit boards or connectors.
- Place a removed component board-side-up on an antistatic surface or in a static shielding container. If you plan to return the component to the factory, immediately place it in a static shielding container.
- Avoid contact between the printed circuit boards and clothing. The wrist strap only protects components from ESD voltages on the body; ESD voltages on clothing can still cause damage.
- Never attempt to remove the printed circuit board from the metal carrier.

Caution For safety, periodically check the resistance value of the antistatic strap. The measurement should be between 1 and 10 megohm (Mohm).

Supported Hardware

The Cisco SCE8000 platform supports the following hardware:

- One Service Control Module (SCE8000-SCM-E), with an optional redundant Service Control Module (FRU).
- One SPA jacket module (SCE8000-SIP), with either two or four SPA 10GBE interface modules (all FRU).
- Up to two optical bypass modules installed in the bottom slot of the chassis.
- Hot-swappable fan assembly, redundant AC-input or DC-input power supplies.

Removing and Replacing the Power Supply

This section describes how to remove and install power supplies for the Cisco SCE8000.

Note In systems with redundant power supplies, you can replace the faulty supply while the system is operating.

Required Tools

A flat-blade or number 2 Phillips-head screwdriver is required to perform these procedures. Additionally, a wire cutter or scissors may be necessary for cutting cable tie-wraps.

Removing an AC-Input Power Supply

Warning **Hazardous voltage or energy is present on the backplane when the system is operating. Use caution when servicing.**

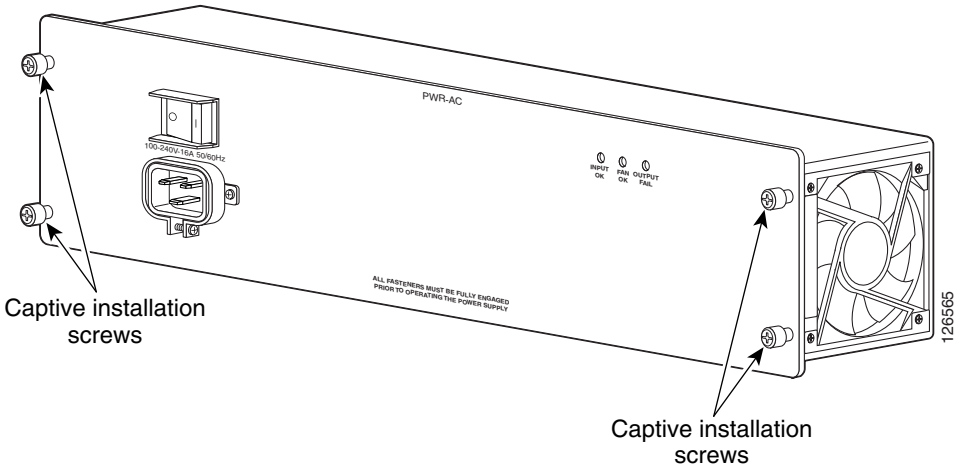
Step 1 Turn the power switch to the Off (0) position on the power supply you are removing.

Step 2 Disconnect the power cord from the power source. Do not touch the metal prongs on the power cord when it is still connected to the power supply.

Step 3 Remove the power cord from the power connection on the power supply module. Do not touch the metal prongs embedded in the power supply.

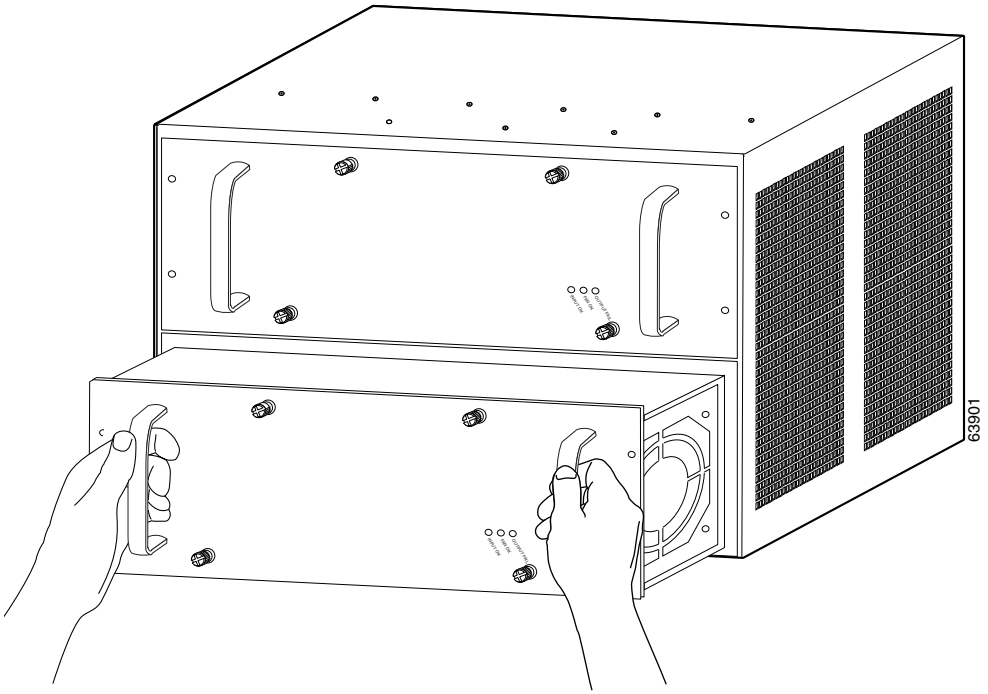
Step 4 Loosen the captive installation screws on the power supply.

Figure 9-1 AC Power Supply Captive Installation Screws



Step 5 Grasp both power supply handles, as shown in Figure 9-2, and slide the power supply completely out of the chassis.

Figure 9-2 Handling the AC Power Supply



Installing an AC-Input Power Supply

Warning **This product requires short-circuit (over current) protection, to be provided as part of the building installation. Install only in accordance with national and local wiring regulations.**

Step 1 Ensure that the system (earth) ground connection has been made. For ground connection instructions, see Connecting the System Ground, page 4-16

Step 2 Verify that the power switch is in the Off (0) position.

Step 3 Grasp both power supply handles, as shown in Figure 9-2. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Step 4 Securely tighten the power supply captive installation screws. (See Figure 9-1.)

Warning **Power supply captive installation screws must be tight to ensure protective grounding continuity.**

Step 5 Plug the power cord into the power supply.

Step 6 Connect the other end of the power cord to an AC-input power source.

Caution In a system with dual power supplies, connect each power supply to a separate input source. In case of a power source failure, the second source will most likely still be available.

Step 7 Turn the switch on the power supply to the On (|) position.

Step 8 Verify power supply operation by checking the power supply LEDs.

The power supply LEDs should be in the following states:

- INPUT OK LED is green
- FAN OK LED is green
- OUTPUT FAIL LED is not lit

If the LEDs indicate a power problem, see Identifying Startup Problems, page 8-6 for troubleshooting information.

Removing a DC-Input Power Supply

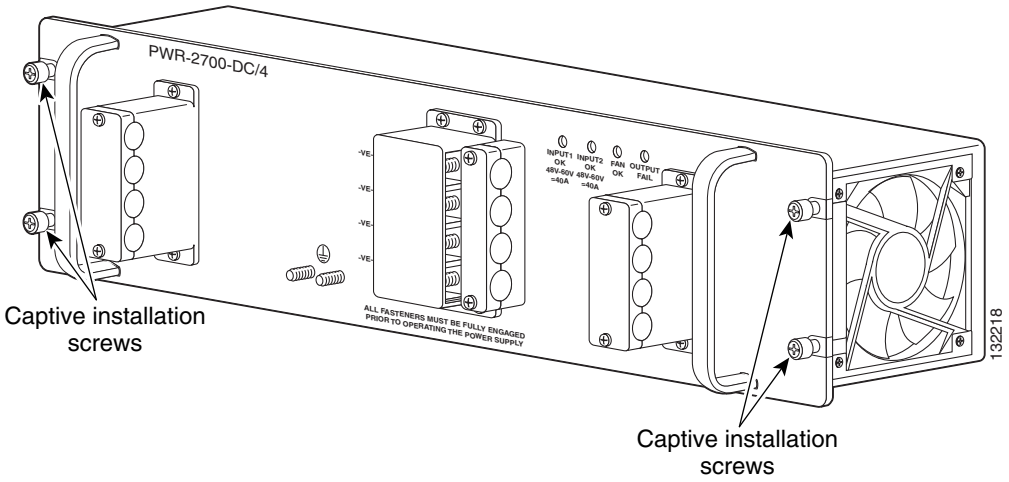
Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.**

Warning **Voltage is present on the backplane when the system is operating. To reduce risk of an electric shock, keep hands and fingers out of the power supply bays and backplane areas.**

Step 1 Verify that power is off to the DC circuit connected to the DC-input power supply you are removing.

Step 2 Remove the four screws securing the terminal block cover, and slide the cover off the terminal block.

Figure 9-3 DC-Input Front Panel for 2700-W DC-Input Power Supply



Step 3 Remove the two screws securing each of the cable holder covers, and remove the cable holder covers off the cable holders.

Step 4 Disconnect the DC-input wires from the terminal block.

Always disconnect the DC-input wires in this order:

- Positive (+)
- Negative (-)
- Ground

Warning **When installing the unit, the ground connection must always be made first and disconnected last.**

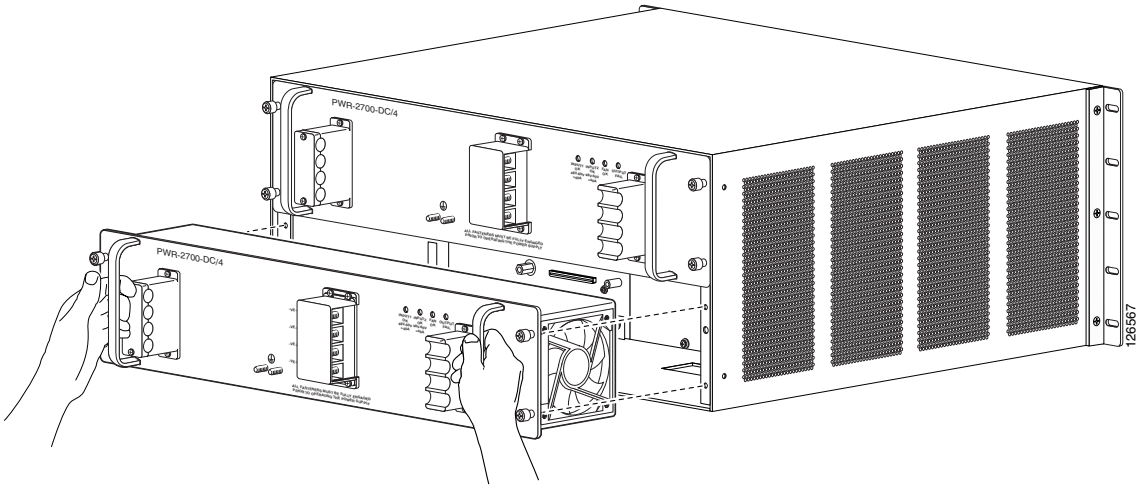
Step 5 Remove the two tie-wraps from the ground cable. If there is a long cable tie securing the cable holders, remove that as well.

Step 6 Loosen the captive installation screws on the power supply.

Caution Use both hands to install and remove power supplies. Each PWR-2700-DC DC/4-input power supply weighs 19.8 pounds (9.0 kg).

Step 7 Grasp both power supply handles, as shown in Figure 9-4, and slide the power supply completely out of the chassis.

Figure 9-4 Handling a DC-Input Power Supply



Installing a DC-Input Power Supply

This section covers the DC-input power supply installation procedure for the Cisco SCE8000 chassis.

Note The DC return is to remain isolated from the system frame and chassis (DC-I).

Warning **Before performing any of the following procedures, ensure that power is removed from the DC circuit.**

Step 1 Power supply ground is required. Install the PWR-2700-DC/4 power supply ground as described in this procedure.

Note The system ground connection with the PWR-2700-DC/4 power supply in a Cisco SCE8000 is provided by the PWR-2700-DC/4 power supply ground. Additionally, you can connect a system (earth) ground.

Note You must always connect the PWR-2700-DC/4 power supply ground.

Note You must connect the PWR-2700-DC/4 power supply ground for both power supplies.

Note If you intend to use an additional system (earth ground), ensure that the system ground connection has been made. For ground connection installation instructions, see Connecting the System Ground, page 4-16.

Step 2 Remove the plastic bag attached to the front panel and put aside. This bag contains two plastic terminal block barriers, two cable ties, and two cable holder covers.

Step 3 Verify that power is off to the DC circuit connected to the power supply you are installing. Grasp both power supply handles, as shown in Figure 9-4. Slide the power supply into the power supply bay. Make sure that the power supply is fully seated in the bay.

Step 4 Tighten the power supply captive installation screws.

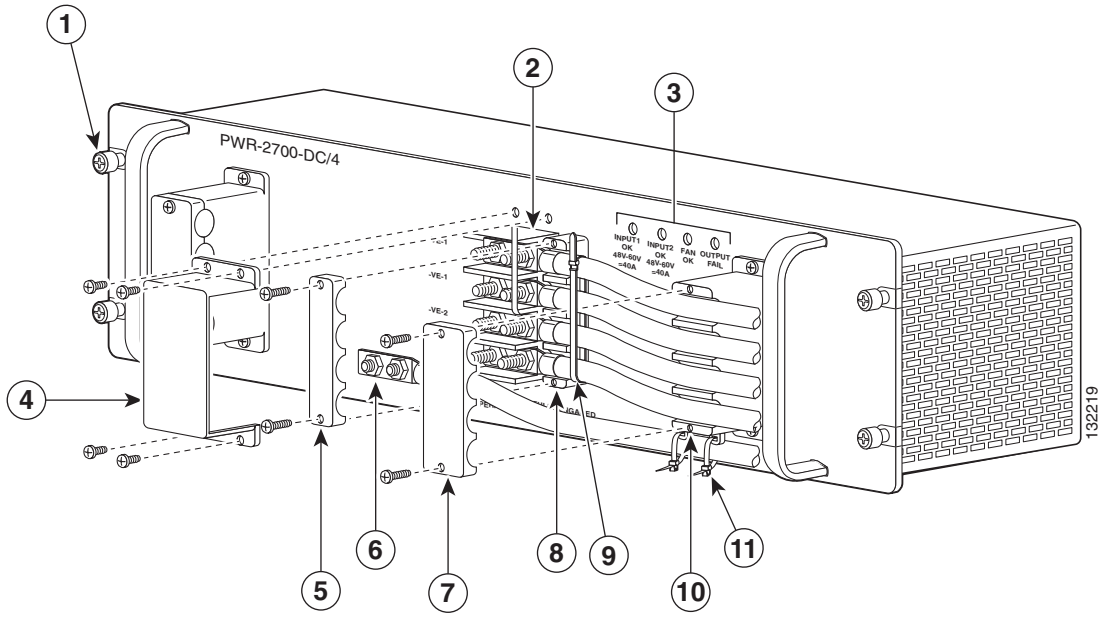
Warning **Power supply captive installation screws must be tight to ensure protective grounding continuity.**

Note As the power requirement of the SCE8000 will not exceed 1350W, it is not necessary to connect two pairs of input wires to each power supply. Should it be desired to connect two pairs of input wires, both pairs of input wires for one 2700W DC-input power supply must come from the same battery system (A feed); and both pairs of input wires for the other power supply must come from another battery system (B feed).

Note For multiple DC input power supply, each DC input must be protected by dedicated circuit breaker or fuse. The circuit breaker or fuse should be sized according to the power supply input rating and local or national electrical code requirements.

Step 5 Remove the four screws securing the terminal block cover, and slide the cover off of the terminal block.

Figure 9-5 DC-Input Front Panel for 2700-W DC-Input Power Supply



1	Captive installation screw	7	Cable holder cover
2	DC power cable terminal block	8	Cable holder

3	Status LEDs	9	Tie-wrap
4	DC power cable terminal block cover	10	Cable holder
5	Cable holder cover	11	Tie-wrap
6	Ground		

Step 6 Attach the appropriate lugs to the DC-input wires and ground wire. The wires should be sized according to local and national installation requirements. Use only copper wire. The maximum width of a lug is 0.600 inch (15.2 mm).

Note Use fine-stranded copper conductors rated for 90-degrees Celsius for North American installations.

Note The power supply terminal block lug opening width is 0.62 inch (15.8 mm). The terminal posts are centered 0.625 inches (15.88 mm) apart and are 1/4-20 threaded. We recommend that you use an appropriately sized industry standard 2-hole, standard barrel compression lug. The power supply ground studs, located below the terminal block, are also threaded 1/4-20 and require two 1/4-inch split-ring washers and two 1/4-20 hex nuts.

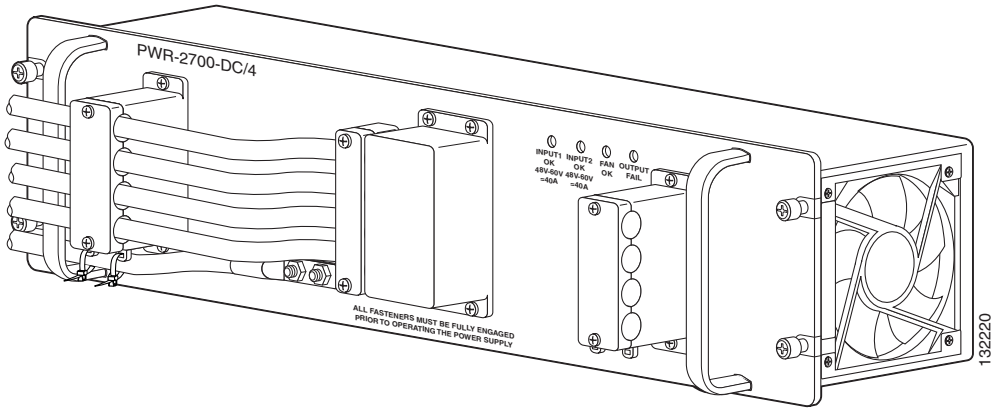
Step 7 Connect the DC-input wires to the 2700 W power supply terminal block . Depending on which side you are connecting the DC-input wires, be sure that the DC-input wires rest in the appropriate cable holder. The following figure shows DC-input wires coming in from the left side.

Connect the DC-input wires to the 2700 W power supply terminal block in this order:

- Ground
- Negative (-)
- Positive (+)

Note When you tighten the terminal nuts, make sure they are snug. Do not over tighten them. Recommended torque strength is 20 inch-pounds. Over tightening the terminal nuts can break the terminal block (Maximum torque: 36 inch-pounds).

Figure 9-6 DC-Input Wires on Left Side



When installing the unit, the ground connection must always be made first and disconnected last.

Step 8 Secure the ground cable to the cable holder with the two cable-ties.

Step 9 Retrieve the cable holder covers from the plastic bag and attach to the front panel at the locations shown in Figure 9-3.

Note If the cable holder illustrated as number 5 and 8 in Figure 9-3 does not hold the DC input cables snugly, please use a long cable tie to secure the cable holders as illustrated in number 9.

Step 10 Secure the terminal block cover using four screws and the terminal block barriers with two screws each.

Step 11 Turn on the DC inputs and verify power supply operation by checking the power supply front panel LEDs.

The power supply rear panel LEDs should be in the following states:

- INPUT OK LED is green
- FAN OK LED is green
- OUTPUT FAIL LED is not lit

If the LEDs indicate a power problem, see Identifying Startup Problems, page 8-6

Removing and Replacing the Fan Assembly

This section describes how to remove and replace fan assemblies for the Cisco SCE8000 chassis.

Required Tools

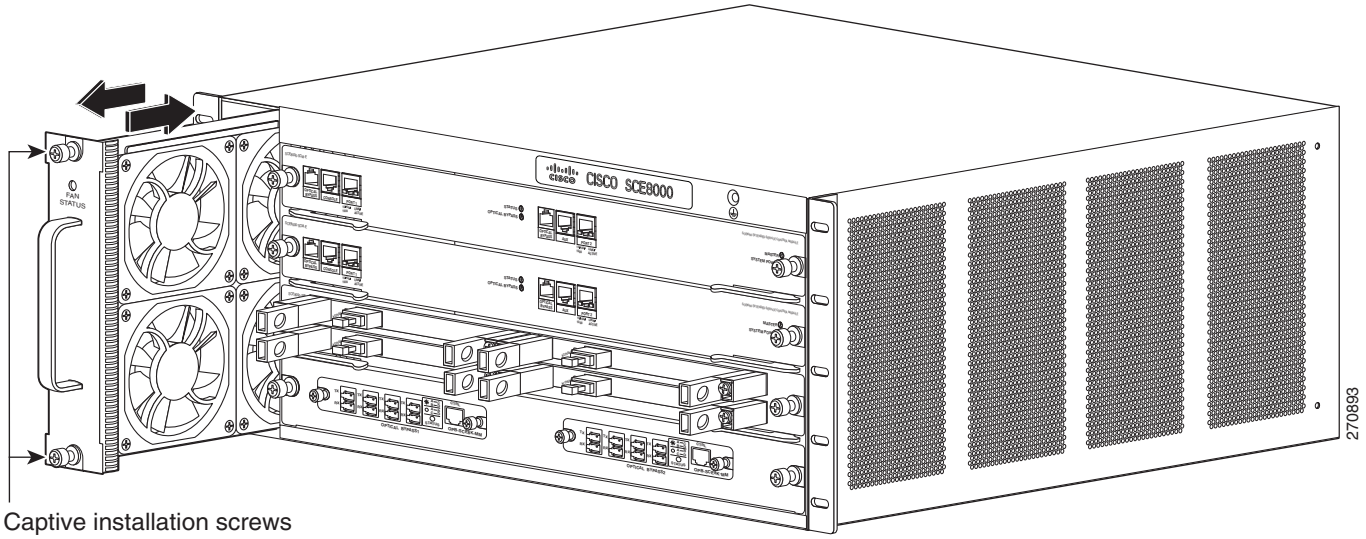
A flat-blade or number 2 Phillips-head screwdriver is required to perform this procedure.

Removing the Fan Assembly

The fan assembly is designed to be removed and replaced while the system is operating without presenting an electrical hazard or damage to the system.

Step 1 Loosen the two captive installation screws by turning them counterclockwise.

Figure 9-7 Fan Assembly



When removing the fan tray, keep your hands and fingers away from the spinning fan blades. Let the fan blades completely stop before you remove the fan tray.

Step 2 Grasp the fan assembly with both hands and pull it outward; rock it gently if necessary to unseat the power connector from the backplane.

Step 3 Pull the fan assembly clear of the chassis, and put it in a safe place.

Installing the Fan Assembly

Step 1 Hold the fan assembly with the fans facing to the right and the FAN STATUS LED at the bottom. (See Figure 9-7.)

Step 2 Place the fan assembly into the front chassis cavity so that it rests on the chassis, and then lift the fan assembly up slightly, aligning the top and bottom chassis guides.

Step 3 Push the fan assembly into the chassis until the power connector seats in the backplane and the captive installation screws make contact with the chassis.

Step 4 Tighten the captive installation screws.

Step 5 Verify that fans are operational.

- Listen for the fans; you should immediately hear them operating. If you do not hear them, ensure that the fan assembly is inserted completely in the chassis and the faceplate is flush with the switch back panel.
- Verify that the FAN STATUS LED is green. If the LED is red, one or more fans is faulty.

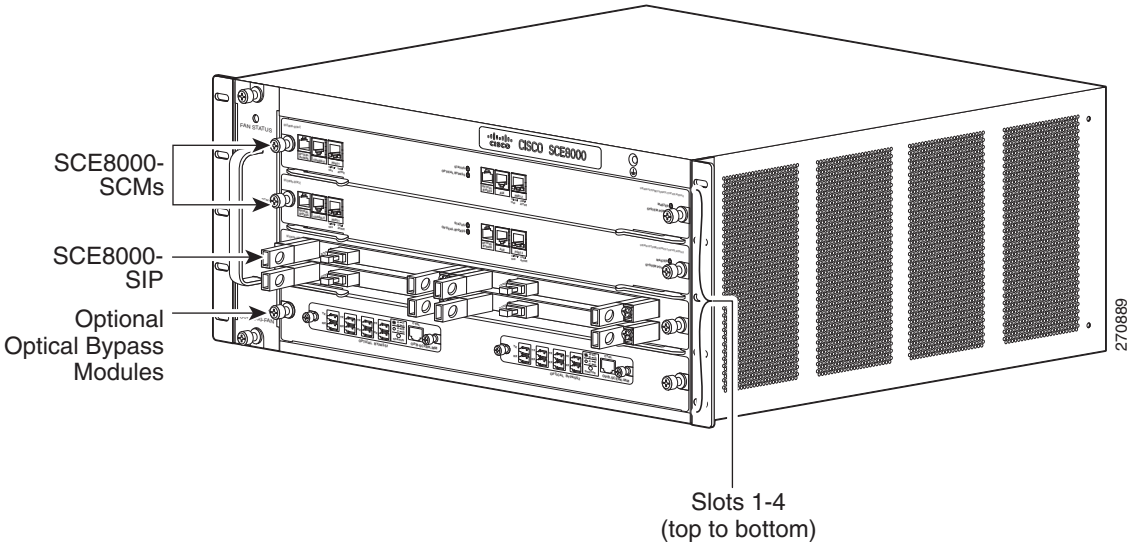
Removing and Replacing Modules

The Cisco SCE8000 platform supports two types of modules:

- Service Control Module (SCE8000-SCM-E)
- SPA Interface Processor (SCE8000-SIP)

The following diagram shows the position of these modules in the Cisco SCE8000 chassis.

Figure 9-8 Slot Numbers on Cisco SCE8000 Chassis



Required Tools

These tools are required to remove or install modules in the Cisco SCE8000 chassis:

- 3/16-inch flat-blade screwdriver
- Number 2 Phillips screwdriver
- Wrist strap or other grounding device
- Antistatic container that the module was shipped in

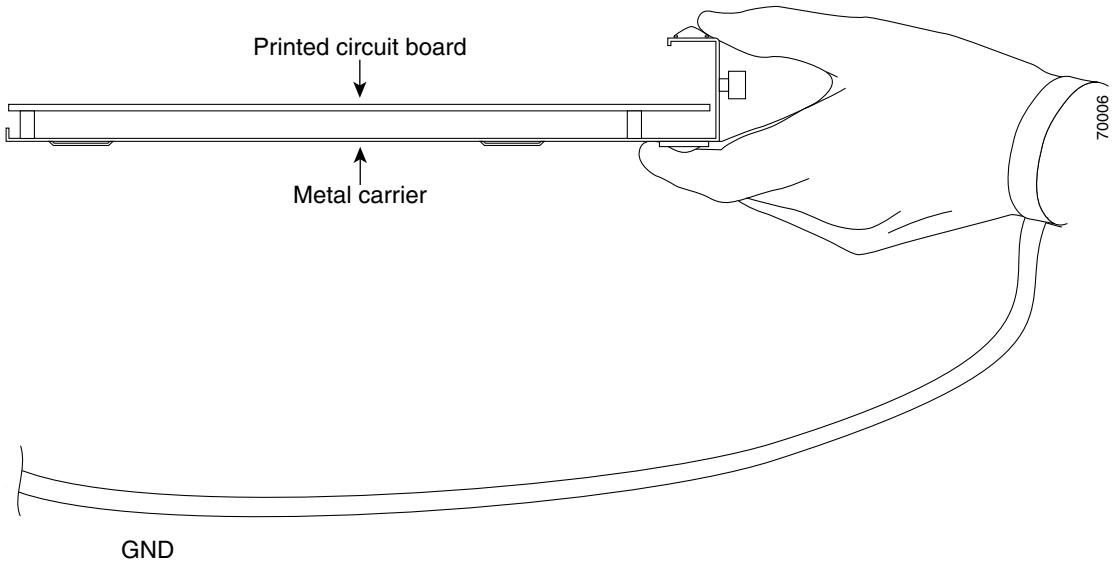
Handling SIPs

Each SIP circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

Always handle the SIP by the carrier edges and handle; never touch the SIP components or connector pins. (See Figure 9-9.)

When a slot is not in use, a blank filler plate must be installed in the empty slot to allow the SCE platform to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a SIP in a slot that is not in use, you must first remove the blank filler plate.

Figure 9-9 Handling a SIP



Installing a Module

Step 1 Choose a slot for the module.

Modules must be installed in the proper slots, as follows:

- A single SCE8000-SCM-E module must be installed in slot #1.
- If a second SCE8000-SCM-E module is used, it must be installed in slot #2.
- The SCE8000-SIP module must be installed in slot #3.

Step 2 At the SCE# prompt, type **reload shutdown** and press **Enter** to power down the Cisco SCE8000 platform before installing or removing any module.

Step 3 Make sure that there is enough clearance to accommodate any interface equipment that you will connect directly to the module ports.

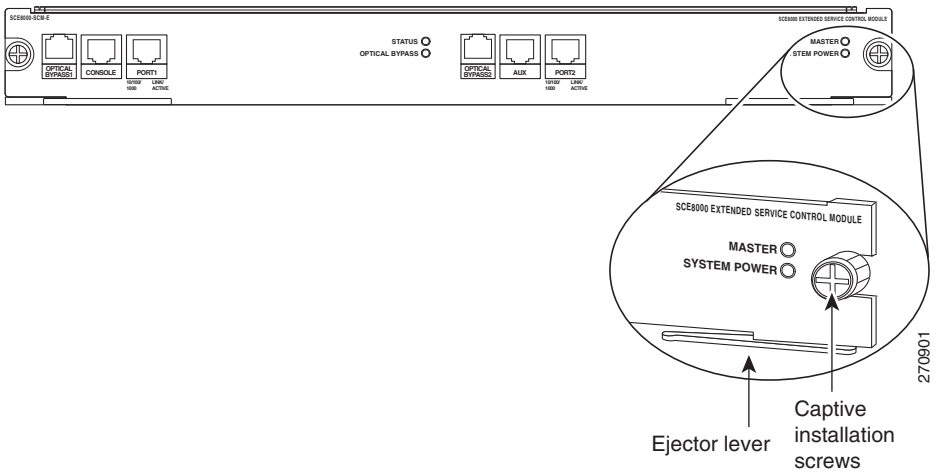
Step 4 Verify that the captive installation screws are tightened on all modules already installed in the chassis to ensure that the EMI gaskets on all modules are fully compressed in order to maximize the opening space for the new or replacement module.

Note If the captive installation screws are loose, the EMI gaskets on the installed modules will push adjacent modules toward the open slot, reducing the opening size and making it difficult to install the replacement module.

Step 5 Remove the module filler plate by removing the two Phillips pan-head screws from the filler plate. To remove a module, follow the procedure in Removing a Module, page 9-17

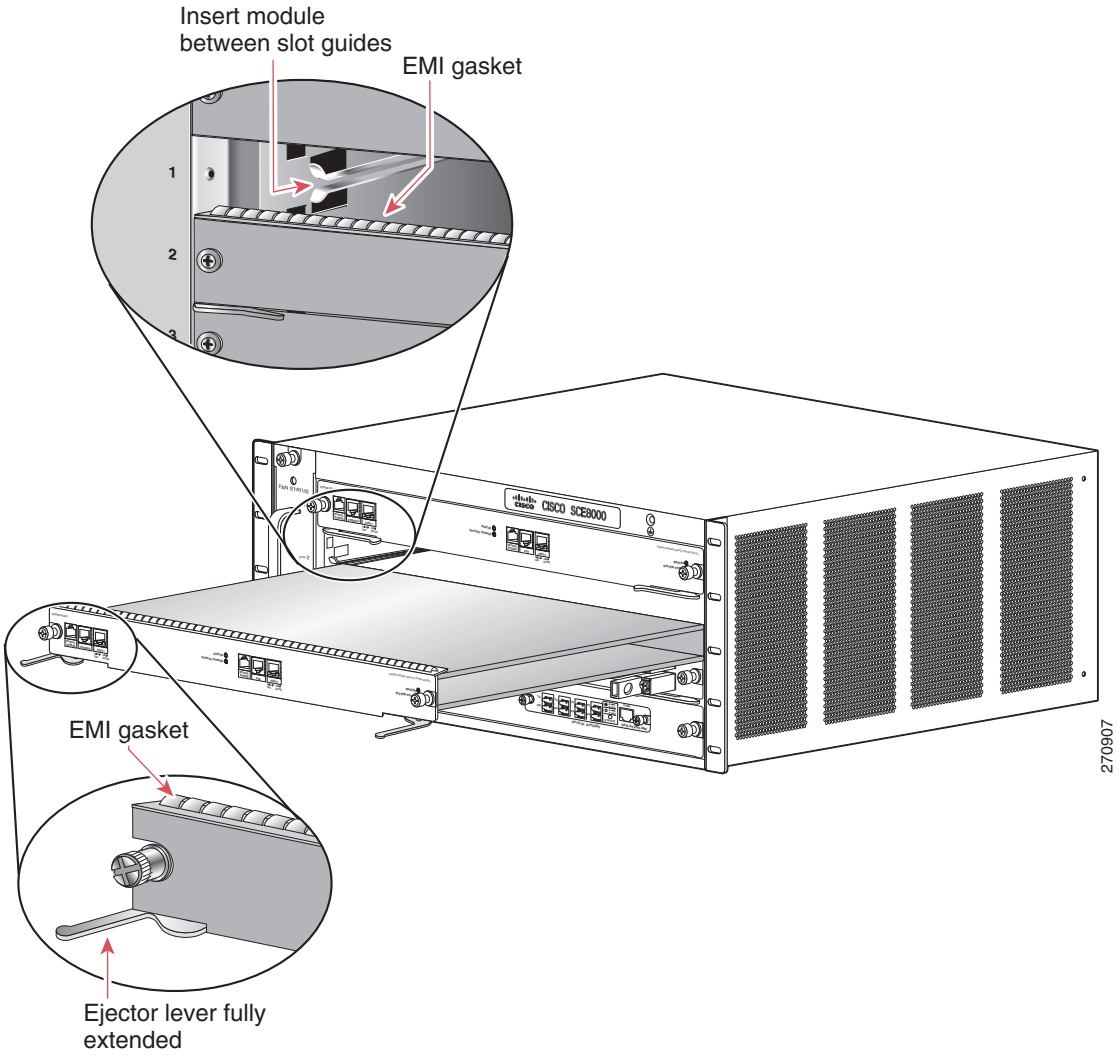
Step 6 Fully open both ejector levers on the new module. (See Figure 9-10.)

Figure 9-10 Ejector Levers and Captive Installation Screws



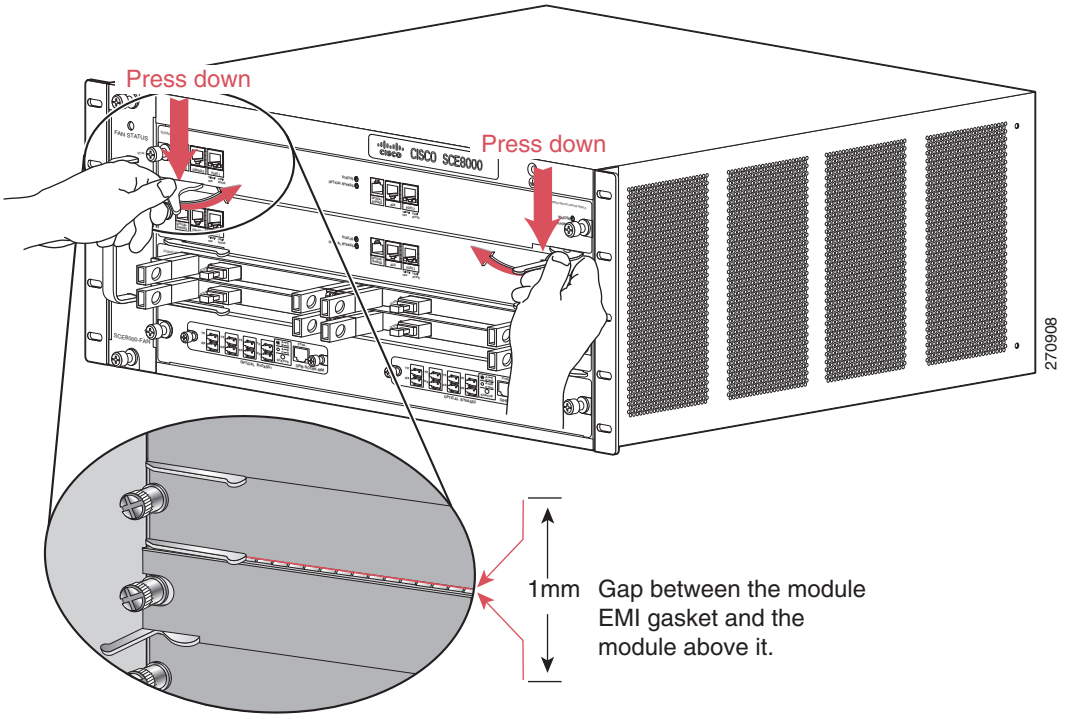
Step 7 Position the module in the slot. (See Figure 9-11.) Make sure that you align the sides of the module carrier with the slot guides on each side of the slot.

Figure 9-11 Positioning the Module in the Slot



Step 8 Carefully slide the module into the slot until the EMI gasket along the top edge of the module makes contact with the module in the slot above it and both ejector levers have closed to approximately 45 degrees with respect to the module faceplate. (See Figure 9-12.)

Figure 9-12 Clearing the EMI Gasket



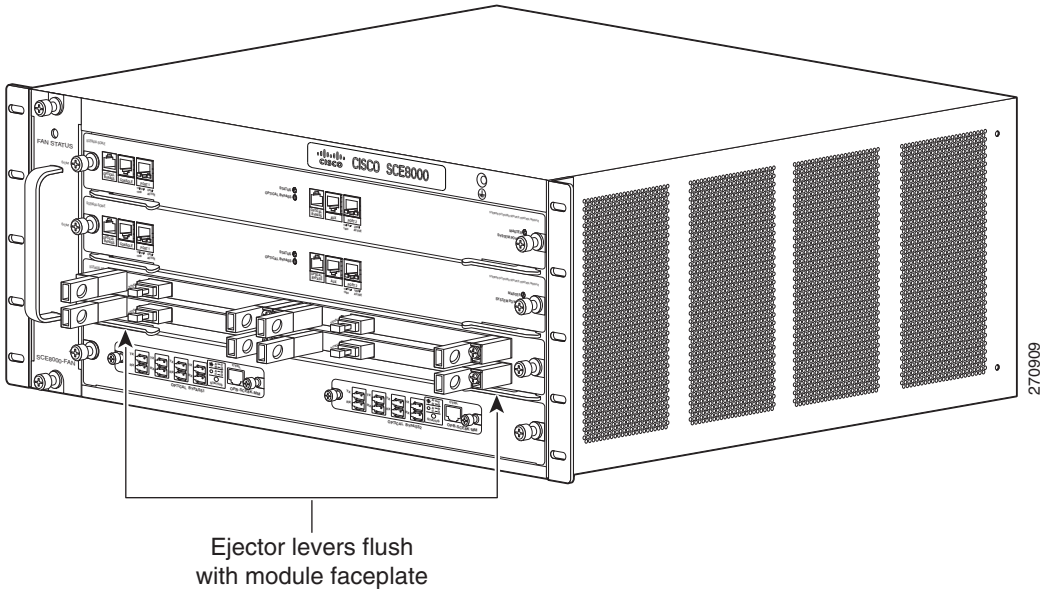
Step 9 Using the thumb and forefinger of each hand, grasp the two ejector levers and press down to create a small (0.040 inch [1 mm]) gap between the module EMI gasket and the module above it. (See Figure 9-12.)

Note Do not press down too forcefully on the ejector levers. They will bend and be damaged.

Step 10 While pressing down, simultaneously close the left and right ejector levers to fully seat the module in the backplane connector. The ejector levers are fully closed when they are flush with the module faceplate. (See Figure 9-13)

Note Failure to fully seat the module in the backplane connector can result in incorrect operation and/or error messages.

Figure 9-13 Ejector Lever Closure



Step 11 Tighten the two captive installation screws on the module.

Note Make sure the ejector levers are fully closed before tightening the captive installation screws.

Removing a Module

Before you remove an SCE8000-SCM, you should first save the current configuration, if the current configuration should be preserved and duplicated on the new SCE8000-SCM-E. (Use the **copy running-config startup-config** command.) This step saves time when bringing the module back online, if the configuration will remain the same or similar. You can recover the configuration by downloading it from the server to the nonvolatile memory of the SCE8000-SCM-E.

Tip When you install a new SCE8000-SCM-E, check the factory default configuration; you might need to reconfigure the system to your requirements. You can reconfigure the SCE8000-SCM-E manually, or if you previously uploaded the original configuration to a server, you can download it to the new SCE8000-SCM-E.

Step 1 At the SCE# prompt, type **reload shutdown** and press **Enter** to power down the Cisco SCE8000 platform before installing or removing any module.

Step 2 Verify that the captive installation screws on all of the modules in the chassis are tight. This step assures that the space created by the removed module is maintained.

Note If the captive installation screws are loose, the EMI gaskets on the installed modules will push the modules toward the open slot, reducing the opening size and making it difficult to install the replacement module.

Step 3 Disconnect all cables.

Step 4 Loosen the two captive screws on the module.

Step 5 Place your thumbs on the left and right ejector levers and simultaneously rotate the levers outward to unseat the module from the backplane connector.

Step 6 Grasp the front edge of the module and slide the module part of the way out of the slot.

Step 7 Pull the module out of the slot. Place your other hand under the module to support the weight of the module. Do not touch the module circuitry.

Step 8 Place the module on antistatic foam, or immediately reinstall it in another slot.

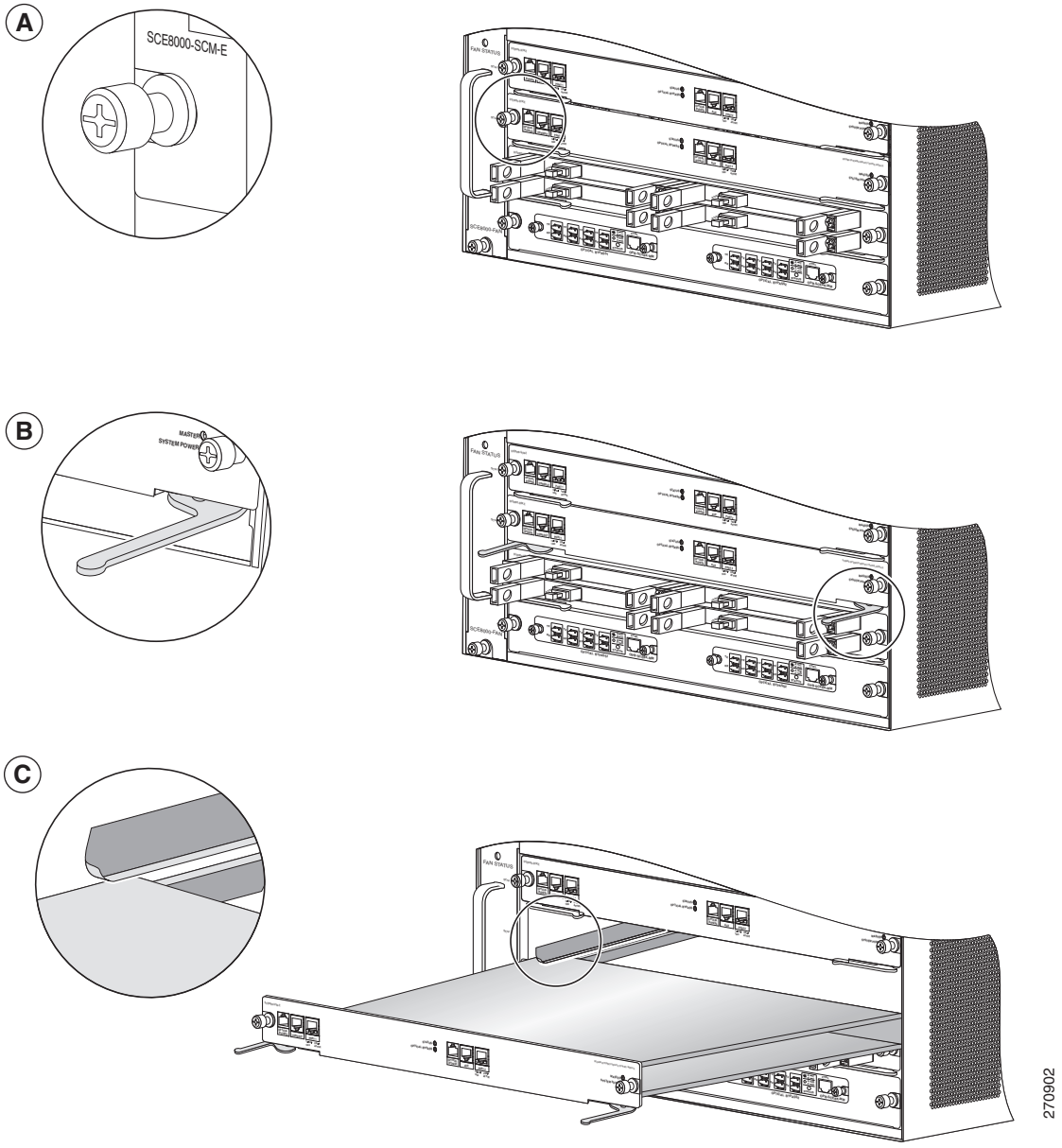
Step 9 If the slot is to remain empty, install a module filler plate to keep dust out of the chassis and to maintain proper airflow through the chassis.

Inserting and Removing a Module: Detail

Refer to the following illustrations for detailed views of:

- A captive screw
- The ejector lever
- The slot guide

Figure 9-14 Module Installation and Removal



Verifying the Installation

Use the **show version** command to verify that the system software and firmware are installed properly.

Step 1 From the SCE>prompt, type **show version** and press **Enter**.

This example shows the output of the **show version** command:

```
System version: Version 3.1.6S Build 279
Build time: Jun 10 2008, 19:27:47 (Change-list 335658)
Software version is: Version 3.1.6S Build 279
Hardware information is:
----------------
Firmware
----------------
kernel : [kernel] 1.0.0/5 (inactive: [kernel] 1.0.0/5)
u-boot : [uboot] 1.0.0/6 (field: [uboot] 0.8.1/13)
select : [ubs-cf1] 1.0.0/5 (secondary: [ubs-cf1] 1.0.0/5)
----------------
Slot 1: SCM-8000
----------------
serial-num : CAT1202G07D
part-num : 73-10598-01 38
cpld : 0x8162
vtpld : 0xc001
summit-0 : 0x10008
summit-1 : 0x10008
dpt/tx : 0x4837
cls/ff : 0x2047
cls flow cap: 33554432

----------------
TVR
----------------
#cpus : 1
cpu SVR : 0x80900120
cpu PVR : 0x80040202
cpu freq : 1000MHz
cpu (eeprom): 2.1, 1000MHz
cpld : 0xa1b7
cpld-ufm : 0xa803
summit : 0x10007
cf : Model=SMART CF, FwRev=0x20060811, Size=4062240KB
----------------
CFC-0
----------------
board type : P2
#cpus : 3
cpu-0 SVR : 0x80900121
cpu-0 PVR : 0x80040202
cpu-0 freq : 1500MHz
cpu-1 SVR : 0x80900121
cpu-1 PVR : 0x80040202
cpu-1 freq : 1500MHz
cpu-2 SVR : 0x80900121
cpu-2 PVR : 0x80040202
cpu-2 freq : 1500MHz
cpu (eeprom): 2.1, 1500MHz
cpld-0 : 0xb20e
cpld-1 : 0xb20e
cpld-2 : 0xb20e
cpld-0-ufm : 0xb803
```

```
cpld-1-ufm : 0xb803
cpld-2-ufm : 0xb803
summit-0 : 0x1000a
summit-1 : 0x1000a
fc : 0x1044
----------------
CFC-1
----------------
board type : P2
#cpus : 3
cpu-0 SVR : 0x80900121
cpu-0 PVR : 0x80040202
cpu-0 freq : 1500MHz
cpu-1 SVR : 0x80900121
cpu-1 PVR : 0x80040202
cpu-1 freq : 1500MHz
cpu-2 SVR : 0x80900121
cpu-2 PVR : 0x80040202
cpu-2 freq : 1500MHz
cpu (eeprom): 2.1, 1500MHz
cpld-0 : 0xb20e
cpld-1 : 0xb20e
cpld-2 : 0xb20e
cpld-0-ufm : 0xb803
cpld-1-ufm : 0xb803
cpld-2-ufm : 0xb803
summit-0 : 0x1000a
summit-1 : 0x1000a
fc : 0x1044
----------------
Slot 3: SIP-8000
----------------
serial-num : CAT1204G01H
part-num : 73-10947-01
cpld : 0x9162
summit-0 : 0x10006
summit-1 : 0x10006
dpt-0 : 0x3033
dpt-1 : 0x3033
spa[0] : SPA-1X10GE-L-V2
spa[1] : SPA-1XTENGE-XFP
spa[2] : SPA-1X10GE-L-V2
spa[3] : SPA-1XTENGE-XFP
----------------
SCE8000 Chassis
----------------
product-num : CISCO7604
serial-num : FOX10420BKZ
part-num : 73-9789-02
part-rev : A0
vid : V01
Part number: 73-10598-01 38
Revision:
Software revision:
LineCard S/N : CAT1202G07D
Power Supply type: AC
SML Application information is:
No application is configured.
Logger status: Enabled

Platform: SCE8000 - 4x10GBE
Management agent interface version: SCE Agent 3.1.6 Build 134
Software package file: ftp://ftpserver/simba.pkg
SCE8000 uptime is 9 minutes, 54 seconds
```

After you verify installation of an SCE8000 module and check connectivity, you must configure the module. For complete information on configuring the Cisco SCE8000 platform, refer to the *Cisco SCE8000 Software Configuration Guide*. For information on all Cisco SCE8000 platform commands, refer to the *Cisco SCE8000 CLI Command Reference* publication.

Removing and Replacing Shared Port Adapters

When removing and replacing the 1-port 10GBE SPAs, please follow these guidelines:

- SPAs must be installed in pairs. The Cisco SCE8000 supports the following SPA configurations:
  - Two SPAs inserted in subslots 0 and 1
  - Four SPAs
- If only two SPAs are installed sublots 2 and 3 must be covered by blank filler panels.

Required Tools and Equipment

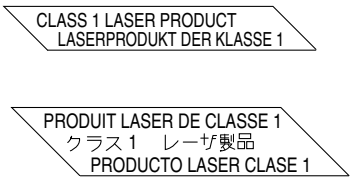
You need the following tools and parts to install SPAs. If you need additional equipment, contact a service representative for ordering information.

- Shared port adapter (SPA)
- Number 1 Phillips and a 3/16-inch flat-blade screwdriver
- Number 2 Phillips screwdriver
- Your own electrostatic discharge (ESD)-prevention equipment or the disposable grounding wrist strap supplied with the SPA
- Antistatic container that the SPA was shipped in

Laser/LED Safety

An optical single-mode transmitter uses a small laser to transmit the light signal to the network ring. Keep the transmit port covered whenever a cable is not connected to it. Although multi-mode transceivers typically use LEDs for transmission, it is good practice to keep open ports covered and avoid staring into open ports or apertures. The transceivers aperture port contains a laser warning label, as shown in Figure 9-15. These warnings apply to SPAs and XFP modules that transmit signals via an optical carrier signal.

Figure 9-15 Class 1 Laser Warning Labels for SPA Ports



Warning **Class 1 laser product. Statement 1008**

Warning **Invisible laser radiation may be emitted from disconnected fibers or connectors. Do not stare into beams or view directly with optical instruments. Statement 1051**

Warning **Class 1 LED product. Statement 1027**

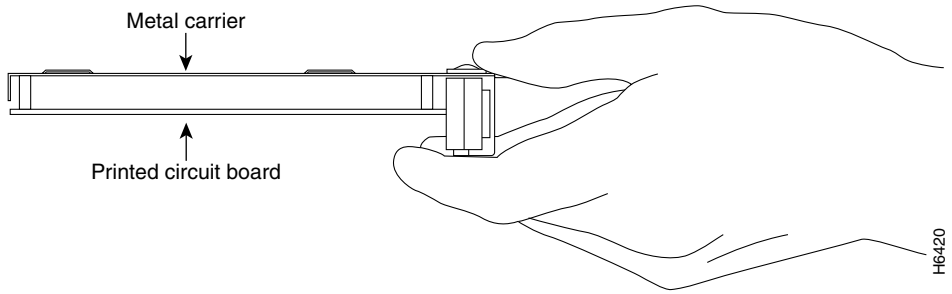
Handling SPAs

Each SPA circuit board is mounted to a metal carrier and is sensitive to electrostatic discharge (ESD) damage.

Always handle the SPA by the carrier edges and handle; never touch the SPA components or connector pins. (SeeFigure 9-16.)

When a subslot is not in use, a SPA blank filler plate must fill the empty subslot to allow the chassis to conform to electromagnetic interference (EMI) emissions requirements and to allow proper airflow across the installed modules. If you plan to install a SPA in a subslot that is not in use, you must first remove the SPA blank filler plate.

Figure 9-16 Handling a SPA



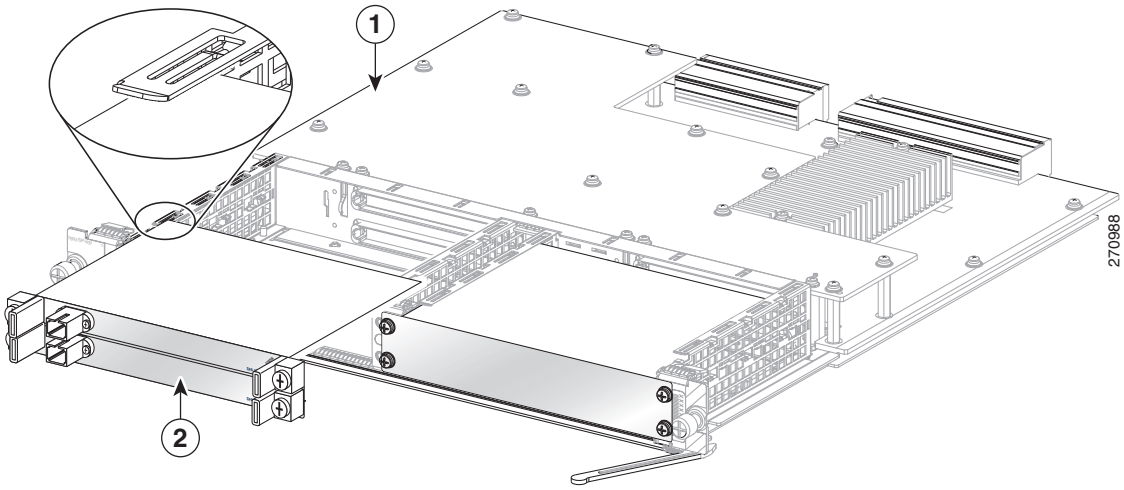
SPA Installation and Removal

Warning **During this procedure, wear grounding wrist straps to avoid ESD damage to the card. Do not directly touch the backplane with your hand or any metal tool, or you could shock yourself. Statement 94**

SPAs can be inserted or removed independently from the SIP. Removal of a SIP with installed SPAs is also supported.

Figure 9-17 illustrates how to install and remove a SPA in the SCE8000-SIP.

Figure 9-17 SPA Installation and Removal



This number...	Indicates this component
1	SCE8000-SIP
2	1X10GBE SPA module

Installing a SPA in a SIP

To install a SPA in a SIP, refer to Figure 9-17 and do the following:

Step 1 At the SCE# prompt, type **reload shutdown** and press **Enter** to power down the Cisco SCE8000 platform before installing or removing any module.

Step 2 To insert the SPA in the SIP, locate the guide rails inside the SIP that hold the SPA in place. They are at the top left and top right of the SPA slot and are recessed about an inch, as shown in Figure 9-17.

Step 3 Carefully slide the SPA all the way in the SIP until the SPA is firmly seated in the SPA interface connector. When fully seated, the SPA might be slightly behind the SIP faceplate.

Step 4 After the SPA is properly seated, fasten the SPA in place with the captive installation screws.

Removing a SPA from a SIP

To remove a SPA from a SIP, refer toFigure 9-17 and do the following:

Step 1 At the SCE# prompt, type **reload shutdown** and press **Enter** to power down the Cisco SCE8000 platform before installing or removing any module.

Step 2 If attached, remove any cables from the SPA.

Step 3 To remove the SPA from the SIP, unfasten the captive installation screws on the SPA.

Step 4 Grasp the handles of the SPA and pull the SPA from the SIP.

Removing and Replacing the Optical Bypass Module

Removing the Optical Bypass Module

Step 1 Disconnect all cables.

Step 2 Loosen the two captive screws on the module.

Step 3 Pull the module out of the slot. Place your other hand under the module to support the weight of the module. Do not touch the module circuitry.

Step 4 Place the module on antistatic foam, or immediately reinstall it in another slot.

Step 5 If the slot is to remain empty, install a module filler plate to keep dust out of the chassis and to maintain proper airflow through the chassis.

Installing the Optical Bypass Module

Step 1 Remove the module filler plate by loosening the two screws.

Step 2 Insert the module into the opening in the panel. There are no guide rails. Do not touch the module circuitry.

Step 3 Tighten the two captive screws on the module.

Step 4 Connect the cables as described in Cabling the 10GBE Line Interface Ports: Using the External Optical Bypass Module, page 6-11.

Replacing the Optical Bypass Module without Disrupting Traffic on the Link

You can replace a malfunctioning SCE8000 platform without disrupting traffic on the link by removing the optical bypass modules while still connected to the network and installing them into the new SCE8000.

Step 1 Install the new SCE8000 platform in the rack. Power up the platform and perform necessary initial configuration.

Step 2 Disconnect the cables connecting the optical bypass module to the old SCE8000 platform. Do not disconnect the cables connecting the optical bypass to the subscriber side or network side network elements.

Step 3 Remove the optical bypass module from the SCE8000 chassis and immediately install it in the new SCE8000 platform. Alternatively, it can be installed in an external mounting panel elsewhere in the rack..

Step 4 Connect the cables from the optical bypass module to the line interfaces of the new SCE8000 platform. See Optical Bypass Module Connectivity, page 6-8.

APPENDIX A

Using Optical Splitters with 10GBE Links

When designing a deployment with the SCE8000, it is important to keep in mind certain characteristics of the 10GBE link that affect the configuration of optical splitters and SPAN ports.

- Ten Gigabit Ethernet does not support autonegotiation (unlike regular GBE). The fixed 10GBE configuration is as follows:
  - duplex = full
  - speed = 10 GBE
- The 10GBE port is UP once it detects light (and correct sync pattern) in the RX input.
- A Switch or Router port will not transmit data unless it is UP (that is, it detects a good signal on the RX input).

Supported Configurations

Due to the 10GBE characterstics described above, the following configurations are supported in the 10 GBE environment.

Figure A-1 Supported Optical Splitter Configuration

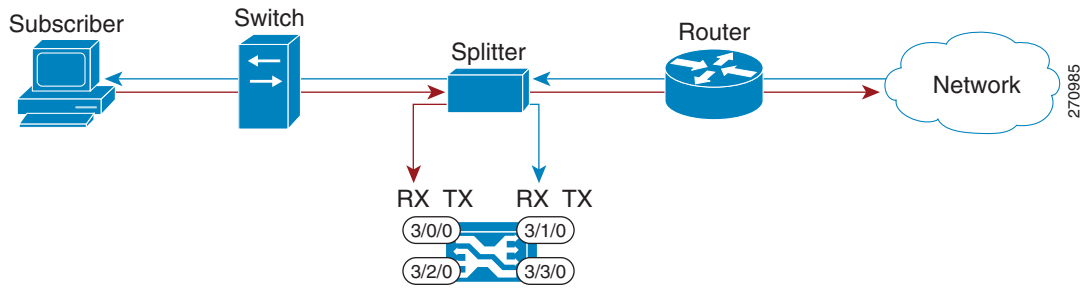
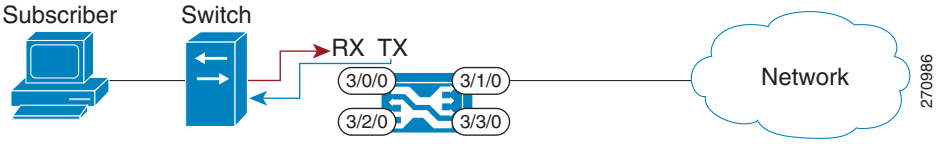


Figure A-2 Supported SPAN Port Configuration



Note In the above configuration, it is essential that the SCE8000 be operating in receive-only mode. Other configurations may cause SPAN port traffic to be returned to the switch, causing unpredictable behavior.

Unsupported Configuration

Due to the 10GBE characterstics described above, the following configuration is not supported in the 10 GBE environment. In this configuration, the switch port remains in the DOWN state and therefore does not transmit.

Figure A-3 Unsupported SPAN Port Configuration